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5/12/2003

SITE SAFETY PLAN

Outboard Marine Corp.

90 Seahorse Drive
Waukegan, IL 60079

T.O. 0117
Contract No. 68-S5-9801

Prepared By:
Environmental Quality Management, Inc.
1800 Carillon Boulevard
Cincinnati, OH 45240

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
EPA CONTRACT NO. 68-S5-9801
EMERGENCY AND RAPID RESPONSE SERVICES, REGION V
SITE SAFETY PLAN

Date: May 12, 2003

Project Name: Outboard Marine Corporation
90 Seahorse Drive
Waukegan, IL 60079

ERRS Task Order #: 117

START Technical Direction
Document #:

U.S. EPA Site I.D.#: 0528

Adopted By: _____ Date: 5/12/03
ERRS Response Manager

Adopted By: _____ Date: 5/12/03
Lead START Member

Adopted By: _____ Date: 5-12-03
U.S. EPA Federal On-Scene Coordinator

Adopted By: _____ Date: _____
ERRS Safety Manager

Adopted By: _____ Date: _____
START Safety Officer

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Victory Memorial Hospital
1324 N. Sheridan Rd
Waukegan, IL
(847) 360-3000

- **E SEA HORSE DR** 0.4
- Turn Right on **E CLAYTON ST** 0.1
- Turn Right on **PERSHING RD** 0.1
- Turn Left on **MATHON DR** 0.2
- Turn Right on **N SHERIDAN RD** 1.0
- **Distance:** 1.8 miles **Approximate Travel Time:** 6 mins

Victory Memorial Hospital
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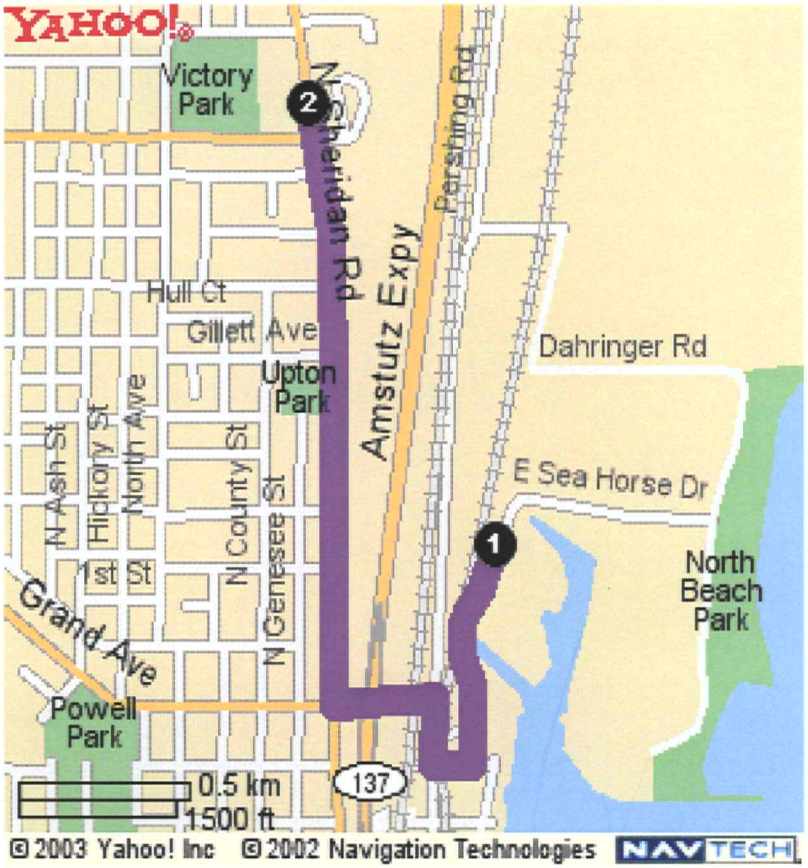

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GLOSSARY OF ACRONYMS AND TERMS

ANSI	-	AMERICAN NATIONAL STANDARDS INSTITUTE
APR	-	AIR PURIFYING RESPIRATOR
ACGIH	-	AMERICAN CONFERENCE OF GOVERNMENTAL INDUSTRIAL HYGIENISTS
AST	-	ABOVEGROUND STORAGE TANK
CFR	-	CODE OF FEDERAL REGULATIONS
CGI	-	COMBUSTIBLE GAS INDICATOR
CLEAN ZONE	-	SUPPORT ZONE
CRZ	-	CONTAMINATION REDUCTION ZONE
DECON	-	DECONTAMINATION
EQ	-	ENVIRONMENTAL QUALITY MANAGEMENT
ERRS	-	EMERGENCY AND RAPID RESPONSE SERVICES
EZ	-	EXCLUSION ZONE
FID	-	FLAME IONIZATION DETECTOR
FOSC	-	FEDERAL ON-SCENE COORDINATOR
GFCI	-	GROUND FAULT CIRCUIT INTERUPTER
HAZWOPER	-	HAZARDOUS WASTE OPERATIONS AND EMERGENCY RESPONSE
HOT ZONE	-	EXCLUSION ZONE
IAW	-	IN ACCORDANCE WITH
IDLH	-	IMMEDIATELY DANGEROUS TO LIFE & HEALTH
MREM/hr	-	MILLI-ROENTGENS EQUIVALENT IN MAN PER HOUR
NIOSH	-	NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY & HEALTH
OSHA	-	OCCUPATIONAL SAFETY & HEALTH ADMINISTRATION
OVA	-	ORGANIC VAPOR ANALYZER
PEL	-	PERMISSIBLE EXPOSURE LIMIT
PID	-	PHOTOIONIZATION DETECTOR
PPM	-	PARTS PER MILLION
PRP	-	POTENTIALLY RESPONSIBLE PARTY
RM	-	RESPONSE MANAGER
SAR	-	SUPPLIED AIR RESPIRATOR
SCBA	-	SELF-CONTAINED BREATHING APPARATUS
SOP	-	STANDARD OPERATING PROCEDURE
START	-	SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM
SZ	-	SUPPORT ZONE
TLV	-	THRESHOLD LIMIT VALUE
TWA	-	TIME WEIGHTED AVERAGE
U.S. EPA	-	U.S. ENVIRONMENTAL PROTECTION AGENCY
VOC	-	VOLATILE ORGANIC COMPOUNDS

INTRODUCTION AND SITE ENTRY REQUIREMENTS

This document describes the health and safety guidelines developed for the Outboard Marine Site, to protect on-site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes. The procedures and guidelines contained herein were based upon the best available information at the time of the plan's preparation. Specific requirements will be revised when new information is received or conditions change. A written amendment will document all changes made to the plan. Any amendments to this plan will be included in Attachment A. Where appropriate, specific OSHA standards or other guidance will be cited and applied.

All work practices and procedures implemented on site must be designated to minimize worker contact with hazardous materials and to reduce the possibility of physical injury. All work will be performed in accordance with applicable Federal 29CFR 1910 and 1926 Health and Safety Regulations and specifically 29CFR 1910.120 Hazardous Operations and Emergency Response.

DAILY SAFETY MEETINGS

Daily safety meetings will be held at the start of each shift to ensure that all personnel understand site conditions and operating procedures, to ensure that personal protective equipment is being used correctly and to address worker health and safety concerns.

SITE SAFETY PLAN ACCEPTANCE/ACKNOWLEDGMENT

The FOSC or designated representative shall be responsible for informing all individuals entering the Exclusion Zone (EZ) or Contamination Reduction Zone (CRZ) of the contents of this plan and ensuring that each person signs the Site Safety Plan (SSP) Acknowledgment Form in Attachment Z. By signing the SSP Acknowledgment Form, an individual acknowledges he/she recognizes the potential hazards present on-site and the policies and procedures required to minimize exposure or adverse effects of these hazards.

1.0 SITE BACKGROUND AND SCOPE OF WORK

1.1 ROLES AND RESPONSIBILITIES

Federal On-Scene Coordinator (FOSC):

The FOSC, as the representative of the U.S. EPA, is responsible for overall project administration and for coordinating health and safety standards for all individuals on-site at all times. All U.S. EPA and contractors health and safety guidelines and requirements as well as all applicable OSHA standards shall be applied. The FOSC is the overall site safety officer and will be responsible for the health and safety of on-site visitors. However, each contractor (as an employer under OSHA) is also responsible for the health and safety of its employees. If there is any dispute with regards to health and safety, the following procedures shall be followed:

1) Attempt to resolve the issue on-site; and,
2) If the issue cannot be resolved, on-site personnel shall consult off-site health and safety personnel for assistance and the specific task operation in dispute shall be discontinued until the issue is resolved.

Response Manager (RM):

The RM, as the field representative for the ERRS clean-up contractor, Environmental Quality Management, Inc. (EQ) has the responsibility for fulfilling the terms of the delivery order. The RM must oversee the project and ensure that all technical, regulatory and safety requirements are met. It is the RM's responsibility to communicate with the FOSC as frequently as dictated by the FOSC, but at least daily, regarding site clean-up progress and any problems encountered.

Superfund Technical Assessment and Response Team (START):

The START contractor, Tetra Tech EM Inc., is responsible for providing the FOSC with assistance and support in regards to all technical, regulatory and safety aspects of site activity. The START is also available to advise the FOSC on matters relating to sampling, treatment, packaging, labeling, compatibility, transport, and disposal of hazardous materials, but is not limited to the above-mentioned.

Site Safety Officer (SSO):

The ERRS and START Site Safety Officers will be assigned to the site on a full-time basis with functional responsibility for implementing the Site Safety Plan as it applies to ERRS and START personnel. The RM is the designated ERRS SSO. The Lead START Member is the designated START SSO unless otherwise appointed. Site audits may be conducted by the ERRS Safety Manager, START personnel and/or the U.S. EPA, as approved by the FOSC.

Specific Duties Include:

a. Assume responsibility for health and safety of ERRS and/or START personnel.
b. Document safety problems.
c. Supervise decontamination of personnel and equipment.
d. Ensure that monitoring equipment is calibrated/operational.
e. Conduct personal air monitoring on all ERRS and/or START employees as outlined in 29CFR 1910.120(h)(4).
f. Perform respirator fit tests.
g. Inventory/inspect PPE prior to personnel site entries.
h. Prepare summary letter of personal air sampling results.
i. Select protective equipment levels based upon chemical properties, method of contact and air sample results.
j. Prepare and maintain OSHA Log within 3 days of accident.
k. Insure all ERRS and/or START personnel are fit for duty based on medical surveillance reports.
l. Inspect first aid kits/fire extinguishers/SCBAs.

Other:

Any person who observes safety problems should immediately report observations/concerns to appropriate key personnel listed in Section 1.2.

1.2 Key Personnel

U.S. EPA Federal On-Scene Coordinator (FOSC)/ Site Safety Officer:	Ken Theisen 77 W. Jackson Blvd SE-SJ Chicago, IL 60604 (312)886-1959 office
ERRS Contractor:	Environmental Quality Management, Inc. (EQ) 1800 Carillon Boulevard Cincinnati, OH 45240 800-500-0575
ERRS Response Coordinator:	John Mullane (EQ)
ERRS Safety Manager:	Chris McKinney (EQ)
ERRS Response Manager:	Jeff Rhinefield (EQ)
ERRS Team Subcontractor:	Environmental Restoration LLC 16333 Westwoods Business Park Drive Ellisville, MO 63021 888-814-7477
START Contractor:	Tetra Tech EM Inc. 26600 Telegraph Road, Suite 400 Southfield, MI 48034 248-350-9684
Lead START Member/ Site Safety Officer:	Ken Brown

1.3 Site Background

OMC was built during several phases between 1927 and 1975. Plant #1 Manufacturing activities included aluminum and cast iron machining, electoless tin plating,spray painting, wastewater treatment,final assembly of outboard motors, vapor degreasing with chlorinated solvents, chromate conversion coating, engine testing, die-casting and electroplating. Plant #2 was built in 1949. Its manufacturing operations included aluminum smelting and holding, aluminum die-casting, aluminum machining, polishing and finishing, spray painting, parts assembly, parts washing, chromate conversion coating and wasteawater pretreatment. There are two sets of pipe chases underneath the floor in the east and west ends of Plant #2.

OMC used hydraulic fluid containing polychlorinated biphenyls (PCB) in its die casting operations from 1961 to 1972. In the 1980's, sediment in Slip#3 and the Waukegan Harbor was found to contain PCB's at 500PPM and over. The PCB was reportedly discharged through floor drains to the North Ditch and Slip#3 of the Waukegan Harbor. Between 1989 and 1995, remedial activities included hydraulic dredging of sediment in the North Ditch and Waukegan Harbor, thermal treatment of the sediments, and placement in three containment cells constructed onsite, the East and West Containment Cell and Slip#3.Each cell has well systems that maintain inward hydraulic gradient.

1.4 Scope of Work for ERRS Contractor

The ERRS' Scope of Work for this project includes the following:

1) Prepare a site health and safety plan and a site specific work plan;
2) Establish and maintain site security;
3) Secure and contain all hazardous substances on site;
4) Stabilize and dispose of all hazardous wastes, substances, pollutants, or contaminants from drums, tanks, containers, heavily contaminated soils, and debris at approved disposal facilities in accordance with the U.S. EPA Off-Site Rule (40 CFR - 300.400);
5) Take any response action to address any release or threatened release of a hazardous substance, pollutant, or contaminant that the U.S. EPA determines may pose an imminent and substantial endangerment to the public health or the environment.

1.5 Scope of Work for START

The START representative is to maintain CERCLA paperwork; monitor clean-up contractor performance; assist the FOSC in providing site safety oversight and monitoring; assist in the preparation of a removal action site safety plan; conduct air monitoring; prepare sampling plans; conduct/assist multimedia sampling; assist compatibility testing; prepare POLREPs; provide photo documentation; organize site files according to FOSC appendices; and prepare an outline after-action-report.

2.0 TASK SAFETY AND HEALTH RISK ANALYSIS

2.1 Task Specific Hazards and Controls

This section is to be addressed in the daily safety meeting as each task is to be attempted. The site work plan should be referenced for further details of each task. Each Task-Specific Safety Assessment is designed to develop awareness to chemical and physical hazards specific to each task. It would be impractical to repeat in complete detail each control measure and SOP for each job task. Sources and Hazards will be addressed for each job task with reference made to applicable control measures in Sections 2.2, 2.3 and SOP's. The tables in Section 2.2 and 2.3 should be posted in the break area and command post. When the Task-Specific Safety Assessments are discussed additional hazards may need to be addressed.

TASK-SPECIFIC SAFETY ASSESSMENT 1

JOB TASK: Site Mobilization, Setup, and Demobilization: The assigned work crew will mobilize at the Outboard Marine Site and secure the site.

PERSONAL PROTECTIVE EQUIPMENT: Level D (with booties as necessary), work is limited to Support Zone

HAZARD	SOURCES	CONTROL MEASURES	REF.
Muscle strain	Lifting heavy equipment and bending	Utilize proper lifting techniques. Use mechanical devices for handling materials greater than 60 pounds when possible. Utilize buddy system.	Table 2-2
Slip, trip, and fall	Debris and oily/wet surfaces	Use caution, use buddy system, flag or mark hazards, good housekeeping.	Att. F, BB
Chemical exposure	Leaking tanks, contaminated soils	Limit set up operations to only "clean" areas. Perform air monitoring to assure proper PPE is utilized (may upgrade to Level C).	Table 2-1 and 6-1
Biological Hazards	Snakes, ticks, vermin, etc.	Hazard recognition training, use buddy system, use caution, avoid vermin and areas where they may exist.	Sec. 2.3
Electrocution	Energized utilities	Use qualified electrician during site set up, properly ground hand tools, GFCI on electrical lines which are not a part of permanent wiring.	Sec. 2.3
Traffic Control/struck by vehicle	Adjacent roads and site traffic	Barricade work areas to deter traffic from personnel. If work is to be performed near traffic area, high visibility vests must be worn on personnel. Utilize traffic spotter during loading and unloading equipment.	Att. DD
Heat or Cold Stress	Weather conditions, physical activity, and wet clothing	Breaks in climate controlled areas, use buddy system, provide sufficient drinking water, maintain dry clothing inventory, monitor weather forecasts and dress appropriately, SSO monitoring of workers.	Sec. 6.5, Att. N
Vandalism	Unsecured site, inadequate lighting	Security personnel on duty during off site hours. Ensure adequate lighting at possible entry points. Lock all access points after hours. Roving patrol as needed.	See Att. CC

TASK-SPECIFIC SAFETY ASSESSMENT 2

JOB TASK: Container Staging, Inspection, Inventory, Sampling, and Shipping

PERSONAL PROTECTIVE EQUIPMENT: Level B or C for hazardous waste; modified Level D for non-hazardous waste.

HAZARD	SOURCES	CONTROL MEASURES	REF.
Slip, trip, and fall	Debris, tanks, drums, slick surfaces	Use caution while walking. Use clear pathways to access drum area. Clear as much debris as possible in work area.	Att. F
Chemical exposure	Waste containers (tanks, trailers, drums) and contents	Wear appropriate PPE at all times. Periodic real time air monitoring to determine respiratory protection.	Sec. 6.2
Punctures	Debris, nails, glass, sharp edges	Wear heavy work gloves during drum handling. Avoid handling debris manually if possible, use mechanical devices for handling.	Sec. 2.3
Biological Hazards	Miscellaneous debris and sharps	Wear appropriate PPE. Avoid direct contact with the debris if possible. Use shovels, brooms, bobcat, etc. to handle debris. If bio waste is encountered, do not handle, notify RM.	Sec. 2.3
Handling heavy objects, muscle strain	Drums	Observe proper lifting techniques. Obey sensible lifting limits (60-pound maximum per person manual lifting). Use mechanical lifting equipment (hand carts, trucks, loader) to move large, awkward loads. Buddy system.	Sec. 2.3, Att. G
Fire	Sparks from tools in presence of flammable liquids/vapors	Use non-spark tools, use remote opening procedures if necessary. Eliminate sources of ignition from the work area. Prohibit smoking. Provide ABC fire extinguishers in all work areas, flammable storage areas, and generator and compressor locations. Store flammable liquids in well-ventilated areas. Post "NO SMOKING" signs. Store all compressed gas cylinders upright and put caps in place when not in use. Separate flammable and oxidizers by 20 feet.	Sec. 2.3, Att. G, K, V, and EE

TASK-SPECIFIC SAFETY ASSESSMENT 2

JOB TASK: Container Staging, Inspection, Inventory, Sampling, and Shipping

PERSONAL PROTECTIVE EQUIPMENT: Level B or C for hazardous waste; modified Level D for non-hazardous waste.

HAZARD	SOURCES	CONTROL MEASURES	REF.
Heat or Cold Stress	Weather conditions, physical activity, and wet clothing	Breaks in climate controlled areas, use buddy system, maintain dry clothing inventory, monitor weather forecasts and dress appropriately, provide sufficient drinking water, SSO monitoring of workers.	Sec. 6.5, Att. N

TASK-SPECIFIC SAFETY ASSESSMENT 3

JOB TASK: Tank Entry (Permit Required Confined Space) - some tanks may need to be entered

PERSONAL PROTECTIVE EQUIPMENT: Level B or C, depending on air monitoring.

HAZARD	SOURCES	CONTROL MEASURES	REF.
Slip, trip, and fall	Uneven and/or wet surfaces, oily residues, poor lighting, elevated walkways, unstable walkways	Use caution, use buddy system, inspect walkways/manways prior to use and repair as necessary, utilize fall protection for elevated work, complete SSP amendment for confined spaces.	Att. F, & S
Confined space explosive atmosphere	Atmosphere	Non sparking tools will be used while working in confined spaces.	
Contaminant inhalation and/or contact	Tank contents	Air monitoring for contaminants, wear prescribed PPE. Adhere to Confined Space SOP.	Sec. 6.2, Att. S
Heat or cold stress	Weather conditions, physical activity, and wet clothing	Breaks in climate controlled areas, use buddy system, maintain dry clothing inventory, monitor weather forecasts and dress appropriately, provide sufficient drinking water, SSO monitoring of workers.	Sec. 6.5, Att. N

TASK-SPECIFIC SAFETY ASSESSMENT 4

JOB TASK: Equipment/Facility Decontamination and Tank/Trailer Cleanout

PERSONAL PROTECTIVE EQUIPMENT: Level B or C

HAZARD	SOURCES	CONTROL MEASURES	REF.
Slip, trip, and fall	Wet working surfaces	Be sure of footing.	Att. F
Contact with contaminants	Waste	Wear proper PPE and decon properly.	Att. C
Hit with high pressure washer	Pressure washer during decon	Only trained operators will use equipment, do not point washer at personnel.	Sec. 2.3, Att. L
Heat or cold stress	Weather conditions, physical activity, and wet clothing	Breaks in climate controlled areas, use buddy system, maintain dry clothing inventory, monitor weather forecasts and dress appropriately, provide sufficient drinking water, SSO monitoring of workers.	Sec. 6.5, Att. N

TASK-SPECIFIC SAFETY ASSESSMENT 5

JOB TASK: Tank/Trailer Cleaning, Demolition of Tanks

PERSONAL PROTECTIVE EQUIPMENT: Level "C or B" PPE (depending on air monitoring).

HAZARD	SOURCES	CONTROL MEASURES	REF.
Exposure	Tank/trailer Contents	Wear appropriate PPE. If contents are known. level "C" PPE may be worn. Perform necessary air monitoring. Avoid entry if possible by performing work from manway access or after demob is complete.	Sec. 4.0
Flammable Atmosphere	Tank/trailer Contents	Monitor for % LEL. Access tanks/trailers by utilizing sparkproof tools. Ventilate or purge as needed to remove flammable atmosphere from tank. Remove ignition sources.	Sec. 6.2, Att. EE
Asbestos	Tank Insulation	Proper PPE will be worn. Air monitoring will be provided. Proper abatement procedures will be followed.	
Noise	Equipment	Wear appropriate hearing protection	Sec. 2.3 & 6.4
Heavy equipment, rigging, shears	Demolish steel tanks, loading and removal of scrap	Utilize experienced operator. Inspect equipment prior to use. Clear and designate route for equipment during moving. Inspect rigging and clear personnel during lifting and use taglines as needed. Designate a fall area for demo debris and clear personnel. Work space is limited, utilize spotter to safely maneuver equipment. Utilize experienced operator with shear experience during demo activities.	Att. M and C
Heat/Cold stress	Temperature, PPE, exertion	Breaks in climate controlled areas, use buddy system, maintain dry clothing inventory, monitor weather forecasts and dress appropriately, provide sufficient drinking water, SSO monitoring of workers.	Sec. 6.5, Att. N

TASK-SPECIFIC SAFETY ASSESSMENT 6

JOB TASK: Pressure Washing Decontamination

PERSONAL PROTECTIVE EQUIPMENT: Level C or D dependent on air monitoring.

HAZARDS	SOURCES	CONTROL MEASURES	REF.
Slip, trip, and fall	Wet working surfaces	Watch footing; buddy system, use floor dry as necessary	Att. F
Contact with contaminants	Contaminated soil and water	Avoid direct contact; wear proper PPE; decon properly	Sec. 2.2
Heat/Cold Stress	Weather, physical activity, wet clothing	Breaks in climate controlled areas, use buddy system, provide sufficient drinking water, SSO monitoring of workers.	Att. N
Water splash (high pressure)	Power washer	Trained operators only, keep unnecessary personnel away, use caution tape to barricade area.	Att. L
Collision, crush trauma	Heavy Equipment	Eye contact w/operator, spotter if required	Att. M
Biological Hazards	Snakes, ticks, vermin, etc.	Hazard recognition training, use buddy system, use caution, avoid vermin and areas where they may exist.	Sec. 2.3

TASK-SPECIFIC SAFETY ASSESSMENT 7

JOB TASK: Air Monitoring; periodic, routine air sampling

PERSONAL PROTECTIVE EQUIPMENT: Level C, upgrade as instruments indicate

HAZARD	SOURCES	CONTROL MEASURES	REF.
Chemical exposure	Drum contents	Air monitoring for contaminants. Wear proper PPE at all times.	Sec. 6.2
Slip, trip, and fall	Debris, wet surfaces	Use buddy system. Maintain awareness of surroundings.	Att. F
Heat or cold stress	Weather conditions, physical activity, and wet clothing	Breaks in climate controlled areas, use buddy system, maintain dry clothing inventory, monitor weather forecasts and dress appropriately, provide sufficient drinking water, SSO monitoring of workers.	Sec. 6.5, Att. N

2.2 Chemical Hazards

Attachment C - Chemical Hazard Information, contains generic MSDSs for anticipated materials.

This listing should not be taken as a complete assessment of the hazards posed by materials at the Outboard Marine Site. The known and unknown mixed chemical hazards at this site prevent a clear determination of the specific effects of discrete compounds. Therefore, personnel must be alert for symptoms of possible exposure such as unusual smells, stinging, burning eyes, nose and throat, skin irritation, as well as feeling extremely well, depressed, sleepy or tired. Symptoms must be immediately reported to the RM.

TABLE 2-1 - CHEMICAL HAZARDS SUMMARY

CHEMICAL	Exposure Limits	Physical Characteristics	Routes of Exposure	Symptoms Acute/ Chronic	First Aid
PCB	PEL .5 mg/m3 REL .001 mg/m3 IDLH 5mg/m3	Colorless to pale yellow, viscous liquid or solid with a mile, hydrocarbon odor	Eye, Skin, Breathing, Swallow	Irritation eyes, chloracne, liver damage, reproductive effects.	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately.
Silver	PEL: 0.01 mg/m3 IDLH: 10 mg/m3	Metal: White, lustous solid.	Inhalation, skin, eyes, ingestion	Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance.	Inhalation: artificial respiration; Skin: water; Eyes: flush 15 minutes, rinse with water; Ingestion: seek medical attention/treatment.
Chromium	PEL: 1 mg/m3 IDLH: 250 mg/m3	Blue-white to steel-grey, lustrous, brittle, hard, odorless solid.	Inhalation, skin, eyes, ingestion	Irritation eyes, skin; lung fibrosis	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Ethyl Benzene	PEL: 100ppm IDLH: 800ppm	Colorless liquid with an aromatic odor	Inhalation, skin, eyes, ingestion	Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma	Inhalation: artificial respiration; Skin: water; Eyes: flush 15 minutes, rinse with water; Ingestion: seek medical attention/treatment.
Barium Chloride	PEL: 0.5 mg/m3 IDLH: 50 mg/m3	White, odorless solid	Inhalation, skin, eyes, ingestion	Irritation eyes, skin, upper respiratory system, skin burns, gastroenteritis, muscle spasm, slow pulse, extrasystoles, hypokalemia	Inhalation: artificial respiration; Skin: water; Eyes: flush 15 minutes, rinse with water; Ingestion: seek medical attention/treatment

CHEMICAL	Exposure Limits	Physical Characteristics	Routes of Exposure	Symptoms Acute/ Chronic	First Aid
Methyl Isobutyl Ketone	TLV: 50ppm PEL: 100ppm	Colorless liquid, with characteristic odor	Inhalation, skin, eyes, ingestion	irritates eyes, skin, and respiratory tract. Aspiration into the lungs with risk of chemical pneumonitis.	Inhalation: artificial respiration; Skin: water; Eyes: flush 15 minutes, rinse with water; Ingestion: seek medical attention/treatment
Cadmium	PEL: 0.005 mg/m3 IDLH: 9 mg/m3	Metal. Silver-white, blue tinged lustrous, odorless solid	Inhalation, skin, eyes, ingestion	Pulmonary edema, dyspnea, cough, chest tightness, substernal pain, headache, chills, muscle aches, nausea, vomiting, diarrhea, anosmia	Eye: Irrigate Immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately
Toluene	PEL: 200ppm IDLH: 500ppm	Liquid	Inhalation, skin, eyes, ingestion	Irritation of eyes, nose; lassitude, confusion, euphoria, dizziness, headache; dilated pupils, lacrimation, anxiety, muscle fatigue	Inhalation: artificial respiration; Skin: soap and water; Eyes: flush 15 minutes, rinse with water; Ingestion: seek medical attention/treatment.
2-Butanone	PEL: 200ppm IDLH: 3000ppm	Colorless liquid	Inhalation, skin, eyes, ingestion	Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis	Inhalation: fresh air; Skin: water; Eyes: flush 15 minutes, rinse with water; Ingestion: seek medical attention/treatment.

2.3 Physical Hazards

Since these site operations will be conducted in a former chrome plating, aluminum smelting, and die casting facility, debris should be cleared to allow safe work areas. All containers containing liquid or liquid residual should be identified and marked to ensure traffic will be directed away from potential pathways. Additional lighting is needed to ensure visibility throughout buildings.

The risk of exposure to physical hazards will be from noise, contact with moving parts and struck by equipment. Table 2-2 provides a general physical hazard analysis.

TABLE 2-2 GENERAL PHYSICAL/ENVIRONMENTAL HAZARD ANALYSIS

HAZARD	PRE PLANNING TO CONTROL HAZARD	ACTIVE CONTROL MEASURES
Electrical	1. Locate and mark existing energized lines. 2. De-energize lines if necessary to perform work safely. 3. All electrical circuits will be grounded. 4. All 120 volt single phase which are not a part of the permanent wiring will have a ground-fault interrupter in place. 5. Temporary wiring will be guarded, buried or isolated by elevation to prevent accidental contact by personnel or equipment. 6. Evaluate potential for high moisture/standing water areas and define special electrical wiring needs-typically requirement for low voltage lighting systems.	1. Use a ground fault interrupter (GFI). 2. Use grounded tools. 3. First aid on site.
Ergonomic	1. All operations evaluated for ergonomic impact. 2. Procedures written to define limits of lifting, pulling, etc. 3. Procedures to define how personnel will utilize proper ergonomic concepts and utilize mechanical material handling equipment. 4. Necessary mechanical material handling equipment specified and ordered for project.	1. Proper body mechanics techniques stressed and enforced on a daily basis. 2. Mechanical handling equipment maintained and utilized. 3. Proper body mechanics stressed in scheduled safety meetings. 4. Injuries reported and medically treated if in doubt about severity. 5. Operations changed as necessary based on injury experience or potential.
Existing Site Topography	1. Survey site prior to layout. Identify areas unsafe for personnel or equipment due to physical conditions. 2. Identify/locate existing utilities. 3. Determine impact of site operations on surrounding properties, communities, etc. 4. Identify mechanized equipment routes both on site and onto and off the site. 5. Layout site into exclusion and contamination reduction zones based on initial site evaluation.	1. Awareness to work environment - regular inspection/audits to identify changing conditions. 2. Shut down operations when unknown conditions encountered. 3. Utilize physical barriers, signs and markings.

TABLE 2-2 GENERAL PHYSICAL/ENVIRONMENTAL HAZARD ANALYSIS

HAZARD	PRE PLANNING TO CONTROL HAZARD	ACTIVE CONTROL MEASURES
Fires & Explosions	1. Evaluate all operations for fire and explosion potential. 2. Define specific procedures for unique operations presenting unusual hazard such as flammable tank demolition. 3. Ensure that properly trained personnel and specialized equipment is available. 4. Define requirements for handling and storage of flammable liquids on site, need for hot work permits and procedures to follow in the event of fire or explosion. 5. Define the type and quantity of fire suppression equipment needed on site. 6. Coordinate which local fire fighting agencies to discuss unique fire hazards, hazardous materials, etc. 7. Ensure site operations comply with 29CFR 1910.157G.	1. Inspect fire suppression equipment on a regular basis. 2. Store flammables away from oxidizers and corrosives. 3. Utilize Hot Work Permit for all hot work on site. 4. Follow any site specific procedures regarding work around flammables. 5. Review and practice contingency plans. Discuss on regular basis at scheduled safety meetings.
Flammable Vapor and Gases	1. Evaluate site to determine sources of likely flammable gas or vapor generation. 2. Develop specific procedures to be followed in the event of exposure to flammables. 3. Specify specialized equipment needs for inerting flammable atmospheres, ventilating spaces and monitoring flammable vapor concentrations. 4. Define requirements for intrinsically safe equipment. 5. Develop contingency plan to follow in the event of fire or explosion.	1. Calibrated monitoring equipment available and utilized by trained personnel whenever working where flammable gas or vapor is present. 2. Monitoring performed at regular frequency and in all areas where vapor could generate or pool. 3. Equipment and operations shut down when threshold levels are exceeded. 4. Contingency plans reviewed regularly by all involved personnel. 5. Work areas are carefully inspected to look for possible ignition sources. Sources are removed. 6. Operations shut down if specific task procedures can't be followed to the letter.

TABLE 2-2 GENERAL PHYSICAL/ENVIRONMENTAL HAZARD ANALYSIS

HAZARD	PRE PLANNING TO CONTROL HAZARD	ACTIVE CONTROL MEASURES
Heat Stress	1. Anticipate possible elevated temperatures (summer months). 2. Awareness to stress placed on body by specific PPE. 3. Awareness to levels of heat stress symptoms.	1. Proper work/rest schedule and monitoring. 2. Drink plenty of fluids. 3. Buddy system/awareness. 4. First aid on site. 5. Medical care if symptoms persist.
Cold Stress	1. Anticipate possible low temperatures (winter months). 2. Remember the temperature does not have to be below freezing to have a cold stress situation.	1. Warm break area. 2. Warm decaffeinated drinks. 3. Buddy system/awareness. 4. First aid on site. 5. Medical care if symptoms persist.
Heavy Equipment Operations	1. Define equipment routes and traffic patterns for site. 2. Insure that operators are properly trained on equipment operation for all equipment required on project. 3. Define safety equipment requirements, including back up alarm and roll over, for all equipment on site. 4. Define equipment routes and traffic patterns for site. 5. Implement SOP of requiring operators to safety inspect equipment on a daily basis in accordance with manufacturer requirements. 6. Evaluate project requirements to ensure that equipment of adequate capacity is specified.	1. Equipment inspected as required. Equipment repaired or taken out of service. 2. Ground spotters are assigned to work with equipment operators. Utilize standard hand signals and communication protocols. 3. Personnel wear the proper PPE, utilize hearing protection, gloves for handling rigging, etc. 4. Equipment safety procedures discussed at daily scheduled safety meetings. 5. Do not exceed lifting capacities or load limits of equipment in question. 6. Personnel follow basic SOP's which prohibit passengers on equipment.

TABLE 2-2 GENERAL PHYSICAL/ENVIRONMENTAL HAZARD ANALYSIS

HAZARD	PRE PLANNING TO CONTROL HAZARD	ACTIVE CONTROL MEASURES
Illumination	1. Evaluate all operations and work areas to determine lighting requirements. 2. Specify specialized lighting requirements including explosion proof, intrinsically safe, lighting needs. 3. Determine if nighttime outdoor operations are necessary. Evaluate tasks to be performed and number of light plants necessary to allow operations. 4. Ascertain if outdoor lighting from nighttime operations will have an impact on surrounding communities.	1. Inspect specialized equipment and discard or replace as needed. 2. Add additional lighting to areas with lighting deficiencies. 3. Inspect drop cords and portable lights on regular basis. Replace or repair as necessary.
Noise	1. Local community noise standards examined. 2. Expected loud operations evaluated to determine compliance with community standards. 3. Loud operations scheduled for approved time periods. 4. Noise level standards established for equipment brought onto site. 5. Hearing protection requirements defined for personnel expected to have excessive exposures.	1. Personnel receive annual audiogram. 2. Personnel required to wear hearing protection; use baffles and mufflers. 3. Routine noise level monitoring and dosimetry performed. 4. Defective equipment repaired as needed. 5. Ongoing hearing conservation education promoted at scheduled safety meetings. 6. Medical evaluation following noise (impact) exposure if symptoms present themselves.
Personal Injuries	1. Site operations will be evaluated for exposures with serious injury potential such as falling objects, pinch points, flying objects, falls from elevated surfaces, etc. 2. A written Fall Prevention Program will be developed if workers will be required to work at heights greater than 10 feet from unguarded work locations. 3. PPE requirements will be based on potential for injury.	1. Personnel will wear required PPE. 2. Specialized equipment such as rope grabs, winches, etc. will be inspected prior to each use. Defective equipment will be immediately replaced. 3. All injury and near miss incidents will be reported to the SSO. 4. First aid/CPR trained person on site at all times. 5. All injuries will be treated on site with advanced medical treatment being sought if doubt about severity.

TABLE 2-2 GENERAL PHYSICAL/ENVIRONMENTAL HAZARD ANALYSIS

HAZARD	PRE PLANNING TO CONTROL HAZARD	ACTIVE CONTROL MEASURES
Radiation	1. Evaluate potential for exposure to radioactive materials. 2. If likely, develop specialized training program for personnel. 3. Develop plan and specify equipment for monitoring potential radiation sources. 4. Establish health physics dosimetry program. 5. If not likely, implement SOP of stopping work should any sign of radioactive materials become apparent.	1. Perform monitoring as defined in safety plan. 2. Perform necessary calibration and maintenance on monitoring equipment. 3. Employees participate in health physics monitoring program. 4. Notify Response Manager when suspect materials are detected.
Small Equipment Usage	1. Site operations evaluated to determine need for specialized intrinsically safe, explosion-proof and UL approved equipment and instruments. 2. Implement requirement for G.F.I., double insulated tool usage, or assured grounding program in all outdoor operations, will be utilized. 3. Specify equipment needs to ensure that equipment used only for the purpose for which it is designed and to prevent abuse or misuse of the equipment. 4. Specify requirements for the inspections and maintenance of specialized equipment. 5. Specify that all equipment utilized on the project meets all OSHA requirements.	1. First aid on site. 2. Transport for medical care if necessary.
Wildlife	1. Inspect work environment where tasks are being performed. 2. Awareness to bites. 3. Dogs, animals, poison ivy, etc.	1. First aid on site. 2. Seek medical attention if symptoms-signs persist.

TABLE 2-2 GENERAL PHYSICAL/ENVIRONMENTAL HAZARD ANALYSIS

HAZARD	PRE PLANNING TO CONTROL HAZARD	ACTIVE CONTROL MEASURES
Weather Conditions	1. Evaluate prevailing weather conditions for the site. 2. Contingency plans developed for likely severe weather conditions such as tornado, and extreme thunderstorm. 3. Provide for daily weather forecast service in extreme weather areas. 4. Plan to weatherize safety systems, such as showers and eye washes, that would be impacted by extreme cold weather. 5. Order necessary specialized cold weather clothing. 6. Grounding and bonding requirements defined for thunderstorm areas. 7. Sheltered air conditioned break areas provided for extreme hot and cold weather zones.	1. Employees trained in contingency plan for severe weather conditions. 2. Emergency water sources inspected regularly in cold areas. 3. Weather service contacted regularly during storm conditions. 4. Supervisory personnel cease operations during extreme storm conditions (i.e., first scenes of thunderstorms). Personnel evacuate to safe assembly area.

3.0 PERSONNEL TRAINING

3.1 Initial Training

All training complies with 29CFR 1910.120(e).

a. 40-Hour Training

All field employees receive forty hours of classroom training on safe work practices and hazardous waste sites.

b. Supervisor/Managers

Manager and Supervisors receive eight hours of training on safe management of hazardous waste sites.

The following individuals are Site Supervisors:

[1] Jeff Rhinefield
[2] Ken Theisen

3.2 Site Specific Training

a. All assigned personnel will receive site specific training on routes of exposure and adverse health effects associated with the chemicals listed in Section 2.2 (including MSDSs in Attachment C).

b. At least one member of each work crew shall have training in the use of portable fire extinguishers in accordance with 29CFR 1910.157(g).

c. IAW 29CFR 1910.120, all personnel newly assigned to hazardous waste work will receive 3 days of on the job training by an experienced supervisor.

d. Each person entering the site shall sign a statement attesting to the fact that they have read and understand the Site Safety Plan. (See Attachment Z for SSP Acknowledgment Form)

3.3 Annual Refresher

All field employees receive eight hours of refresher training on the above topics within the anniversary date of their initial 40-hour class.

3.4 First Aid/CPR

At least one individual on site will maintain valid and current CPR and First Aid Certification (Response Manager Jeff Rhinefield). Treatment will be limited to Good Samaritan/minor first aid. All traumatic/major first aid, and cardiac problems will be referred to medical facilities.

3.5 Subcontractor Requirements

All subcontractors entering the Contamination Reduction Zone and Exclusion Zone will have adequate training satisfying 29 CFR 1910.120(e).

4.0 PERSONAL PROTECTIVE EQUIPMENT

The following is a brief description of the personal protective equipment (PPE) which may be required during various phases of the project. The U.S. EPA terminology for protective equipment will be used; Levels A, B, C and D.

Respiratory protective equipment shall be NIOSH-approved and use shall conform to OSHA 29 CFR 1910.134 Requirements. Each employer shall maintain a written respiratory protection program detailing selection, use, cleaning, maintenance and storage of respiratory protective equipment. The written Respiratory Protection Program will be maintained at the local and regional offices. Level C will be done during most site activities unless air monitoring necessitates otherwise.

4.1 Level A

Level A protection shall be used when:

- An extremely hazardous substance requires the highest level of protection for skin, eyes and the respiratory system;
- Substances with a high degree of hazard to the skin are known or suspected;
- Chemical concentrations are known to be above IDLH levels; or,
- Biological hazards requiring Level A are known or suspected.

Level A protective equipment use is not anticipated during planned project activities.

4.2 Level B

Level B protection shall be used when:

- The substance(s) has been identified and requires a high level of respiratory protection but less skin protection;
- Concentrations of chemicals in the air are IDLH or above the maximum use limit of an APR with full-face mask;
- Oxygen deficient or potentially oxygen deficient atmospheres (<19.5%) are possible; and/or,
- Confined space entry may require Level B.
- Incomplete identification of gases and vapors, but not suspected to be harmful to skin or skin absorbable.

Level B protective equipment at a minimum shall consist of:

Supplied Air Respirator (SAR)	SCBA or Cascade system w/5-minute egress;
Chemical Resistant/ Protective Coveralls	Polytyvek™ or Saranex;
Inner Gloves	Latex or Nitrile;
Outer Chemical Gloves	Viton or PVA or Nitrile;
Outer Work Gloves	Cotton or leather;
Safety Boots	Steel-toe/Steel Shank;
Boot Covers (booties)	

or Rubber Overboots Robars;	
Hard Hat	Yes
Other:	Hearing protection as required for noisy operations.

4.3 Level C (Most work on site will be done in Level C unless air monitoring necessitates otherwise)

Level C protection shall be used when:

- The same level of skin protection as Level B, but a lower level of respiratory protection is required;
- The types of air contaminants have been identified, concentrations measured, and an air-purifying respirator is available that can remove contaminants; or,
- The substance has adequate warning properties and all criteria for the use of APR respirators has been met.

Level C protective equipment at a minimum shall consist of the same equipment as Level B except the SAR will be substituted with a full face Air Purifying Respirator (APR) with Organic Vapor/Acid Gas HEPA cartridges.

4.4 Level D

Level D protection shall be used when:

- The atmosphere contains no known respiratory hazard; and,
- Work functions preclude splashes, immersion or the potential for unexpected inhalation of, or contact with, hazardous concentrations of harmful chemicals.

Level D protection equipment at a minimum shall consist of:

Rain Suit	As necessary;
Safety Shoes/Boots (type)	Steel-toe/Steel Shank;
Boot Covers (booties)	Latex or Robars;
Work Gloves	Cotton;
Hard Hat	Yes;
Face Shield	As necessary;
Safety Glasses	Yes

Modifications: Hearing protection as required by noisy operations. Polytyvek™ coveralls and Viton, Nitrile or PVA gloves when working and the possibility of a splash exists.

Specific operating procedures for PPE and Respiratory Protection are provided in Attachment D.

4.5 Decisions to Upgrade/Downgrade PPE

a. All decisions to downgrade from Level B to C or C to D must be accompanied by air monitoring results. The ERRS Safety Managers must be advised of on-site decisions to downgrade. All decisions must be documented with an Amendment to the SSP.

b. The following conditions will necessitate reevaluation of PPE use.

1. commencement of a new work activity not previously identified
2. change of job tasks during a work phase

3. change of season/weather
4. contaminants other than those identified in Safety Plan
5. change in ambient levels of contaminants
6. change in work which affects degree of chemical contact

c. Action Levels (See Section 6.0)

5.0 MEDICAL SURVEILLANCE

5.1 Pre-Employment Physical

a. Pre-employment and periodic update medical examinations are required for persons working at hazardous waste sites.
b. All physicals must be completed and documented prior to assignment to the site.
c. All physical exams will be conducted following parameters established by the respective employee's Corporate Physicians.
d. EQ and all permanent team subcontractors must adhere to the Drug Free Workplace Act of 1988.

5.2 Site Specific Physical Examination

a. No site specific physical examination is required for planned project activities.

b. A current Fitness for Duty statement will be kept on site for all personnel.

5.3 Annual Physical Exam

A medical examination must have been completed within a 12-month period prior to on-site activity and repeated annually.

5.4 Accidental/Suspected Exposure Physical

a. Following any accidental or suspected uncontrolled exposure to site contaminants, personnel should be scheduled for a special physical examination.

b. The physical examination will be specific for the contaminants and the associated target organs or physiological system.

c. Exposure to blood/body fluids requires adherence to 29 CFR1910.1030 (Bloodborne Pathogens).

d. Questions regarding the type of physical can be directed to the employer's Director of Health and Safety or their Corporate Physician. See Section 10.2 for their respective phone numbers.

5.5 Contractor Physical Examination Requirements

All subcontractors entering the Contamination Reduction Zone or Exclusion Zone will have adequate medical surveillance satisfying 29CFR 1910.120(f).

5.6 Site Documentation

All personnel on-site must have the following documentation available on site:

[1] Copy of 40-Hour HAZWOPER Training certificate
[2] Copy of Manager's/Supervisor's 8-Hour HAZWOPER certificate (if applicable)
[3] Copy of 8-Hour Annual Refresher (if > 12 months since 40-hour)
[4] CPR/First Aid Certificate (if applicable)
[5] Respirator Fit Test Record
[6] Medical Fitness For Duty Release (if applicable)
[7] Confined Space training certificates

6.0 AIR MONITORING AND ACTION LEVELS

According to 29 CFR 1910.120 (h) Air Monitoring shall be used to identify and quantify airborne levels of hazardous substances and health hazards in order to determine the appropriate level of employee protection needed on-site.

6.1 Routine Air Monitoring Requirements

- Upon initial entry to rule out IDLH conditions;
- When the possibility of an IDLH condition or flammable atmosphere has developed;
- When work begins on a different portion of the site;
- Contaminants other than those previously identified are being handled;
- A different type of operation is initiated;
- Employees are handling leaking drums or containers or working in areas with obvious liquid contamination; and,
- During confined space work.

Air monitoring will consist at a minimum of the criteria listed below. All air monitoring data will be documented and submitted to the FOSC and available in the command post site files for review by all interested persons. Air monitoring instruments will be calibrated and maintained in accordance with the manufacturer's specifications. Calibration and maintenance performed will be entered in the site log and/or instrument log book.

6.2 Site Specific Air Monitoring Requirements

The following table summarizes site air requirements:

TABLE 6-1 AIR MONITORING SUMMARY

INSTRUMENT	COMPOUNDS TO DETECT	FREQUENCY	COMMENTS/ ACTION LEVEL
Combustible Gas Indicator (CGI)	Explosive/ Flammable Atmospheres	As needed, continuous indoors	<=10% proceed with caution; ≥10% evacuate area and re-evaluate
Oxygen Meter	Oxygen	Confined space work	≤ 19.5% or ≥ 23.5% oxygen, evacuate area and re-evaluate
PID/FID	Organic Vapors and Gases	Periodic during drum handling, tank pumping and soil excavation	Unidentified contaminants* ≤ Background units - Level D. > Background - 5 units - Level C. > 5 units - Level B.
Detector Tubes	Benzene Cyanide Hydrocyanic A & D	As necessary to further evaluate PID/FID readings	Benzene action level is 0.5 ppm < 1 ppm - Level D > 1 ppm - 500 ppm - Level C. > 500 ppm - Level B.
Other: MiniRam	Dust particulates Respirable Dust	During tank demo if dusty conditions	> 7.5 mg/m^3 Level "C" PPE > 2.5 mg/m^3 Resp dust Level "C" PPE

* The reading must be sustained for one (1) minute in the breathing zone.

6.3 Personnel Monitoring (Explain strategy or why not required).

See Table 6-1.

6.3.1 Sampling Methods (NIOSH Method No., analyses, media).

6.3.2 Calibration procedures

Calibration of all monitoring equipment used during this project will be in accordance with the manufacturer's instructions.

6.3.3 Analytical laboratory (Name and location)
TBD

6.4 Noise Monitoring (As necessary)

6.5 Heat/Cold Stress Monitoring

Heat stress monitoring for the Outboard Marine site will begin when temperatures exceed 70°F. Heat stress monitoring for personnel working in permeable clothing, such as cotton or synthetic work clothes, will be conducted in accordance with The American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for heat stress. The SSO will be responsible for verifying the work/rest schedules; calculating WBGT using a black globe thermometer, a natural wet bulb thermometer, and a dry bulb thermometer (or WBGT monitor); notifying workers of results; and documenting results.

The SSO will also monitor workers wearing impermeable or semi-impermeable clothing for physiological results by the following checks:

- Heart rate. Count the radial pulse during a 30-second period as early as possible in the rest period.

  If the heart rate exceeds 110 beats per minute at the beginning of the rest period, shorten the next work cycle by one-third and keep the rest period the same. If the heart rate still exceeds 110 beats per minute at the next rest period, shorten the following work cycle by one-third.

- Oral temperature. Use a clinical thermometer (3 minutes under the tongue) or similar device to measure the oral temperature at the end of the work period (before drinking).

  If oral temperature exceeds 99.6°F (37.6°C), shorten the next work cycle by one-third without changing the rest period.

  If oral temperature still exceeds 99.6°F (37.6°C) at the beginning of the next rest period, shorten the following work cycle by one-third.

Do not permit a worker to wear a semipermeable or impermeable garment when his/her oral temperature exceeds 100.6°F (38.1°C).

- Body water loss, if possible. Measure weight on a scale accurate to ± 0.25 lb at the beginning and end of each work day to see if enough fluids are being taken to prevent dehydration. Weights should be taken while the employee wears similar clothing or, ideally, is nude. *The body water loss should not exceed 1.5 percent total body weight loss in a work day.*

Initially, the frequency of physiological monitoring depends on the air temperature adjusted for solar radiation and the level of physical work. A form is provided in Attachment Y to document physiological results.

Cold stress monitoring for the Outboard Marine site will begin when temperatures fall below 50°F. Cold stress monitoring for personnel working in permeable clothing, such as cotton or synthetic work clothes, will be conducted in accordance with The American Conference of Governmental Industrial Hygienists' (ACGIH) Threshold Limit Values for cold stress. The SSO will be responsible for verifying the work/rest schedules; calculating WBGT using a black globe thermometer, a natural wet bulb thermometer, and a dry bulb thermometer (or WBGT monitor); notifying workers of results; and documenting results.

Cold stress monitoring will be completed IAW ACGIH TLVs for cold stress. See Attachment N for cold stress monitoring procedures.

6.6 Perimeter (Describe)

.As necessary

6.7 Name(s) of Monitoring Technician(s)
START

6.8 Location of Monitoring Records

Copies of monitoring records will be retained in the onsite command post during the project and the job file upon completion of the project.

7.0 SITE CONTROL AND STANDARD OPERATING PROCEDURES

7.1 Work Zones

The primary purpose for site controls is to establish the hazardous area perimeter, to reduce migration of contaminants into clean areas and to prevent access or exposure to hazardous materials by unauthorized persons. At the end of each workday, the site will be secured or guarded, to prevent unauthorized entry.

7.1.1 Support Zone

This uncontaminated Support Zone or clean zone will be the area outside the Exclusion Zone (EZ) and Contamination Reduction Zone (CRZ) and within the geographic perimeters of the site. This area is used for staging of materials, parking of vehicles, office facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the EZ. All personnel arriving in the SZ will upon arrival, report to the command post and sign the site entry/exit log. There will be one controlled entry/exit point from the clean zone to the CRZ. The location of the CRZ will be_____.

7.1.2 Contamination Reduction Zone

The Contamination Reduction Zone (CRZ) will provide a location for removal of contaminated personal protective equipment and final decontamination of personnel and equipment. All personnel and equipment should exit the Exclusion Zone via the CRZ area. A separate decontamination area will be established for heavy equipment.

The Contamination Reduction Zone is a buffer zone between contaminated and clean areas identified by caution tape. The CRZ will be located _____.

7.1.3 Exclusion Zone

The Exclusion Zone (EZ) will be the "hot-zone" or contaminated area inside the site perimeter. Entry to and exit from this zone will be made through a designated point and all personnel will be required to sign the hot zone entry/exit log located at the decon area. Appropriate warning signs to identify the Exclusion Zone should be posted (i.e. "DANGER - AUTHORIZED PERSONNEL ONLY", "PROTECTIVE EQUIPMENT REQUIRED BEYOND THIS POINT", etc.) Exit from the Exclusion Zone must be accompanied by personnel and equipment decontamination as described in Section 8.0. The EZ will be identified by caution tape and signage and will include the areas of the building where hazardous waste operations are being conducted. General Safety Rules for Exclusion Zone include:

a. wear the appropriate level of PPE defined in the SSP
b. do not remove any PPE or break the integrity to pick, scratch, or touch parts of your body
c. no smoking, eating or drinking
d. no horseplay
e. no matches or lighters in this zone
f. implement the communication and line of sight system

7.2 General Field Safety Rules

- All visitors must be sent to the command post and referred to the FOSC.
- It is EPA policy to practice administrative hazard control for all site areas by restricting entrance to Exclusion Zone to essential personnel and by using operational SOPs.
- Whenever possible, avoid contact with contaminated (or potentially contaminated) surfaces. Walk around (not through) puddles and discolored surfaces. Do not kneel on the ground or set equipment on the ground. Stay away from any waste drums unless necessary. Protect equipment from contamination by bagging.
- Eating, drinking, or smoking is permitted only in designated areas in the Support Zone.
- Hands and face must be thoroughly washed upon leaving the decon area.
- Beards or other facial hair that interfere with respirator fit will preclude admission to the EZ.
- All equipment must be decontaminated or discarded upon exit from the Exclusion Zone, as determined by the FOSC or designate.
- All personnel exiting the Exclusion Zone must go through the decontamination procedures described in Section 8.0.
- Safety Equipment described in Section 4.0 will be required for all field personnel in the Exclusion Zone.
- Personnel will only travel in vehicles where individual seats (for each occupant are provided. Seat belts will be worn as required.
- Fire extinguishers will be available on site and in all areas with increased fire danger such as the refueling area.
- A minimum of two personnel will always be on site whenever heavy equipment is operated. Only necessary personnel need to be on or around heavy equipment.
- Employees will not interfere with or tamper in any way with air monitoring equipment.
- Backhoes or other equipment with booms shall not be operated within 10 feet of any electrical conductor.
- Visitor log will be maintained at the command post or with the security guard. All personnel coming on site will sign in and out on a daily basis.
- Security will be maintained at the site by closing all gates during normal work hours. The FOSC will assume responsibility for personnel entering site. Site will be locked up in the evening and patrolled by a guard service.

- EPA FOSC will allow only those individuals authorized to enter the site. If unauthorized members of the public are found on site, contact security immediately and do not leave the individual unattended.

- Visitors are not allowed in the work areas without authorization and not without appropriate levels of PPE as determined by site safety personnel. Access to the properties is restricted to the EPA and authorized representatives. All persons must sign in at the Command Post and receive authorization to enter the site.

- Buddy System
  [1] The buddy system is mandatory at anytime that personnel are working in the Exclusion Zone, remote areas, on tanks, or when conditions present a risk to personnel.

  [2] A buddy system requires at least two trained/experienced people who work as a team and maintain at a minimum audible and/or visual contact while operating in the Exclusion Zone.

- Communication Procedures
  [1] Radios will be used for on site communications and Channel 1 will be the designated channel.
  [2] The crews should remain in constant radio or visual contact while on site.
  [3] The site evacuation signal will be 3 blasts on the air or vehicle horn.

8.0 DECONTAMINATION PROCEDURES

In general, everything that enters the Exclusion Zone at this site, must either be decontaminated or properly discarded upon exit from the Exclusion Zone. All personnel, including any state and local officials must enter and exit the hot zone through the decon area. Prior to demobilization, contaminated equipment will be decontaminated and inspected by the FOSC or FOSC designate before it is moved into the clean zone. Any material that is generated by decontamination procedures will be stored in a designated area in the Exclusion Zone until disposal arrangements are made.

All personnel must be documented on the "HOT ZONE ENTRY/EXIT LOG" when entering and exiting the Exclusion Zone.

NOTE: The type of decontamination solution to be used is dependent on the type of chemical hazards. The decontamination solution for this site is soap, Alconox™, and water. Decontamination solution will be changed daily (at a minimum) and collected and stored on-site until disposal arrangements are finalized.

8.1 Procedures for Equipment Decontamination

Following decontamination and prior to exit from the hot zone, the FOSC or a designated alternate, shall be responsible for insuring that the item has been sufficiently decontaminated. This inspection shall be included in the site log.

Equipment decontamination will consist of the following steps:

a) Removal of gross contamination by sweeping or scraping.
b) Hydrospraying equipment.
c) Inspecting equipment prior to removal from CRZ.

Small equipment decon will involve wiping equipment with alcohol wipes or other appropriate decon solution.

8.2 Procedure for Personnel Decontamination

This decontamination procedure applies to personnel at this site wearing Level B and C protection. These are the minimum acceptable requirements:

Station 1: Equipment Drop
Deposit equipment used on-site (tools, sampling devices and monitoring instruments, radios, etc.) on plastic drop cloths. These items must be decontaminated or discarded as waste prior to removal from the exclusion zone.

Station 2: Outer Boot and Outer Glove Wash and Rinse
Scrub outer boots, outer gloves and/or splash suit with decontamination solution or detergent water. Rinse off using water.

Station 3: Outer Boot and Glove Removal
Remove outer boots (if disposable) and gloves. If outer boots are disposable, deposit in container with plastic liner. If non-disposable, store in a clean dry place.

Station 4: Tank Change
If person leaves Exclusion Zone to change air tank, this is the last step in the decontamination procedure. Air tank is exchanged, new outer gloves and boot covers donned, joints taped, and person returns to hot zone.

Station 5: Outer Garment Removal
If applicable, remove SCBA back-pack and remain on air as long as possible. Remove chemical resistant outer garments and deposit in container lined with plastic. Decontaminate or dispose of splash suits as necessary.

Station 6: Respiratory Protection Removal
Remove hard-hat, face-piece, and if applicable, deposit SCBA on a clean surface. APR cartridges will be discarded as appropriate. Wash and rinse respirator at least daily. Wipe off and store respiratory gear in a clean, dry location. (See Attachment D)

Station 7: Inner Glove Removal
Remove inner gloves. Deposit in container for disposal.

Station 8: Field Wash
Thoroughly wash hands and face with soap and water. Shower as soon as possible.

Eating, drinking, chewing gum/tobacco, smoking, or any practice that increases the probability of hand to mouth transfer and/or ingestion of materials is prohibited in any areas where the possibility of contamination exists and is permitted only in the designated break area.

Personnel will not wear or bring dirty/decontaminated clothing into the break areas.

8.3 Emergency decontamination will consist of the following steps:

Move the victim only if it is safe to do so. Decontaminate the victim only to the extent as to allow safe removal of the victim without further injury. Any blood contaminated material or body fluid will be bagged, labeled Biohazard and accompany the individual to the hospital.

8.4 The following decontamination equipment is required:

Tables, chairs, trash cans, scrub brushes, buckets, brooms, scrapers, and cleaning supplies.

8.5 Disposition of Decontamination Wastes

All equipment and solvents used for decontamination shall be decontaminated or disposed of with the established waste streams. Commercial laundries or cleaning establishments that decontaminate or are used to launder contaminated clothing shall be informed of the presence and potentially harmful effects of the contaminants. Less than 50# per month of biohazard waste may be disposed with routine waste.

A sketch of the decon area for this site is provided in Attachment B.

9.0 HAZARD COMMUNICATION PROGRAM

Each contractor will be responsible for maintaining a copy of their Hazard Communication Program and MSDS' on site.

9.1 Material Safety Data Sheets

[1] Material Safety Data Sheets will be maintained at the Command Post in the Health and Safety Binder.
[2] MSDS' will be available to all employees for review during the work shift.
[3] See Attachment C and/or the ERRS Health and Safety Binder.

9.2 Container Labeling

[1] All containers received on site will be inspected by the contractor using the material to ensure the following:
   a. all containers clearly labeled
   b. appropriate hazard warning
   c. name and address of the manufacturer

9.3 Hazardous Chemical List

The following hazardous chemicals are inventoried and used at the site: (TBD onsite)

[1] _____
[2] _____
[3] _____
[4] _____
[5] _____
[6] _____

9.4 Employee Training and Information

[1] Prior to starting work, each employee will attend a health and safety orientation and will receive information and training on the following:
   a. an overview of the requirements contained in the Hazard Communication Standard
   b. hazardous chemicals present at the site
   c. the location and availability of the written Hazard Communication Program
   d. physical and health effects of the hazardous chemicals
   e. methods of preventing or eliminating exposure
   f. emergency procedures to follow if exposed
   g. how to read labels and review MSDS' to obtain information
   h. location of MSDS file and location of hazardous chemical list

Reference the ERRS/START Health and Safety Binder for the Hazard Communication Program and applicable MSDS'.

10.0 EMERGENCIES/ACCIDENTS/INJURIES

It is essential that site personnel be prepared in the event of an emergency. Emergencies can take many forms; illnesses or injuries, chemical exposure, fires, explosions, spills, leaks, releases of harmful contaminants, or sudden changes in the weather. The following sections outline the general procedures for emergencies. Emergency information should be posted as appropriate.

10.1 Emergency Contacts for Outboard Marine Site

Fire:	911
Police:	911
Sheriff:	911
Ambulance:	911
Hospital:	Victory Memorial Hospital
Address:	1324 North Sheridan Rd Waukegan, IL

Telephone: (847) 360-3000 Chemical Trauma Capabilities? Yes

Poison Control Center: 800-222-1222

*Directions from Site to Hospital (See Map in Attachment B):

NOTE: Maps and directions to the hospital will be posted in the Command Post office and Decontamination Area.

The route to the hospital was verified by_____ on _____. Distance from site to hospital is _____ miles. Approximate driving time is ____ minutes. The fire, police, and hospital were notified of site operations by _____ on _____..

The following individuals have been trained in CPR and First Aid:

_____ _____

_____ _____

_____ _____

10.2 Additional Emergency Numbers

National Response Center	800-424-8802
U.S. EPA Region V - E.R. Branch	312-353-2318 (24 hr)
Center for Disease Control	404-488-4100 (24 hr)
AT&F (Explosives Information)	800-424-9555
Chemtrec	800-424-9300

START Contacts

START Corporate H&S - Tracy Poole	678-778-3094
START Emergency Response Coordinator	442-287-0485
START Leader Region V - Tom Kouris	312-856-8700

Environmental Quality Management Inc. Contacts

EQ Regional Office	513-825-7500
EQ ERRS Hotline (24 hr)	800-500-0575
EQ Corporate H&S - J. Kominsky, CIH, CSP	513-825-7500
EQ Safety Manager - C. McKinney	513-825-7500
EQ Program Manager - J. Greber	513-825-7500
EQ Deputy Program Manager - J. Mullane	513-825-7500
Mercy Health Solutions - Dr. J. Tasset	513-874-8111

EPA

Federal Occupational Health Unit	312-353-0379

10.3 Emergency Equipment Available On-Site

Communications Equipment	Location
Private Telephones:	EQ office trailer or EPA Command Post
Two-Way Radios:	Command Post, CRZ and EZ
Emergency Alarms/Horns:	Command post, CRZ and EZ

Medical Equipment

First Aid Kits: Command post and CRZ

Inspection Date: _____ by: _____

Stretcher/Backboard: None.

Eye Wash Station: CRZ

Fire-Fighting Equipment

Fire Extinguishers: Command post, CRZ, and EZ

Inspection Date:____

Other: _____

Spill or Leak Equipment

Absorbent booms/pads and
dry absorbent: CRZ and EZ

Additional Emergency Equipment

None.

10.4 Accident Reporting/Investigation

See Attachment E for proper procedures.

11.0 EMERGENCY RESPONSE CONTINGENCY PLAN

11.1 Project Personnel Responsibilities During Emergencies

FEDERAL ON-SCENE COORDINATOR (FOSC)

As the administrator of the project, the FOSC has primary responsibility for responding to and correcting emergency situations. The FOSC will:

- Take appropriate measures to protect personnel including: withdrawal from the Exclusion Zone, total evacuation and securing of the site or up-grading or down- grading the level of protective clothing and respiratory protection.

- Take appropriate measures to protect the public and the environment including isolating and securing the site, preventing run-off to surface waters and ending or controlling the emergency to the extent possible.

- Ensure that appropriate Federal, State and local agencies are informed, and emergency response plans are coordinated. In the event of fire or explosion, the local fire department should be summoned immediately. In the event of an air release of toxic materials, the local authorities should be informed in order to assess the need for evacuation. In the event of a spill, sanitary districts and drinking water systems may need to be alerted.

- Ensure that appropriate decon treatment or testing for exposed or injured personnel is obtained.

- Determine the cause of the incident and make recommendations to prevent the recurrence.

- Ensure that all required reports have been prepared.

RESPONSE MANAGER (RM)

The RM must immediately report emergency situations to the FOSC, take appropriate measures to protect site personnel and assist the FOSC as necessary in responding to and mitigating the emergency situation.

SUPERFUND TECHNICAL ASSESSMENT AND RESPONSE TEAM (START)

The START must immediately report emergency situations to the FOSC, take appropriate measures to protect site personnel and assist the FOSC as necessary.

11.2 Medical Emergencies:

Any person who becomes ill or injured in the Exclusion Zone must be decontaminated to the maximum extent possible when practical. If the injury or illness is minor, full decontamination should be completed and first aid administered prior to transport. If the patient's condition is serious, at least partial decontamination should be completed (i.e., complete disrobing of the victim and redressing in clean coveralls or wrapping in a blanket.) First aid should be administered while awaiting an ambulance or paramedics. All injuries and illnesses must immediately be reported to the FOSC.

If the first aid provided to an injured person presents the possibility of exposure to blood or other body fluids or potentially infectious material, the care giver must wear surgical type impermeable gloves. The exposure must be reported to the FOSC, the individual's supervisor, and the Site Safety Officer within 24 hours of exposure, naming the injured person(s) and the person(s) administering first aid. Hepatitis B vaccination and treatment must be offered to exposed individuals within 24 hours or as soon as possible after exposure. Exposed individuals may decline the vaccination and treatment but must do so by means of a signed statement.

Any person transporting an injured/exposed person to a clinic or hospital for treatment should take with them directions to the hospital and information on the chemical(s) they may have been exposed to. This information is included in Table 2-1. Any vehicle used to transport contaminated personnel, will be cleaned or decontaminated as necessary.

11.3 Fire or Explosion:

In the event of a fire or explosion, the local fire department should be summoned immediately. Upon their arrival the FOSC or designated alternate will advise the fire commander of the location, nature and identification of the hazardous materials on- site.

If it is safe to do so, site personnel may:

- Use fire fighting equipment available on site.
- Remove or isolate flammable or other hazardous materials which may contribute to the fire.

11.4 Spills, Leaks or Releases:

In the event of a spill or a leak, site personnel will:

- Locate the source of the spillage and stop the flow if it can be done safely.

- Begin containment and recovery of the spilled materials.

11.5 Evacuation Routes and Resources:

Evacuation routes have been established by work area locations for this site. All buildings and outside work areas have been provided with designated exit points. Evacuation should be conducted immediately, without regard for equipment under conditions of extreme emergency. See site map in Attachment B for evacuation routes.

- Evacuation notification will be three blasts on an air horn, vehicle horn, or by verbal communication via radio.

- Keep upwind of smoke, vapors or spill location.

- Exit through the decontamination corridor if possible.

- If evacuation is not via the decontamination corridor, site personnel should remove contaminated clothing once they are in a location of safety and leave it near the Exclusion Zone or in a safe place.

- The FOSC will conduct a head count to insure all personnel have been evacuated safely.

- In the event that emergency site evacuation is necessary, all personnel are to:

    1. Escape the emergency situation;

    2. Decontaminate to the maximum extent practical; and,

    3. Meet at the U.S. EPA command post.

- In the event that the U.S. EPA command post is no longer in a safe zone to meet: personnel will meet at the corner of Jefferson and Crossley.

11.6 Adverse Weather Reaction Plan

Adverse weather can take many forms. Severe thunder and lightning storms, winter storms, hail, freezing rain, flash floods and tornados are a few examples. Sudden changes in the weather, extreme weather conditions, and natural disasters can create a number of hazards. Generally, adverse weather can create hazards due to slips, trips and falls, generation of airborne debris, electrical shock, etc. Natural disasters can create many secondary hazards such as release of hazardous materials into the environment, structure failure and fires.

In the event of impending adverse weather, continuous monitoring will provide current information regarding impending adverse weather. In addition, monitoring of weather broadcasts and television broadcasts will provide information on current weather conditions. The terms "tornado watch" and "tornado warning" may be used during the broadcasts. The former term means that conditions are favorable for their development although none have actually been sighted. The latter term means that a tornado has been visually sighted. Additional weather terminology includes:

Weather Watch - tornado, severe t-storm, flash flood, winter storm, "Conditions are favorable for the development/occurrence of hazardous weather."
Weather Warning - by county issuance
Tornado - tornado sighted or indicated by radar
Severe T-storm - winds > 50 mph an/or 1/4" hail stones sighted or predicted by radar
Flash Flood - sighted or indicated by radar

Information provided by the emergency and weather radio broadcasts will be used to determine whether and actions need to be taken by project personnel. The EPA FOSC in conjunction with the Response Manager and Site Safety Officer will decide what operations, if any, are safe to perform based on existing and anticipated weather conditions, and shall notify personnel when to stop operations and seek shelter.

Obviously, the best protection against most severe weather episodes and natural disasters is to seek shelter before a storm hits. When notification is given that severe weather (particularly tornados) is approaching an area where project personnel are located, begin to secure the site. If experiencing a severe weather the EPA FOSC will decide whether to stop work activities and have affected personnel seek shelter.

At the site, workers in Level B and C personal protective equipment will be instructed to: 1) leave the building, doff protective clothing and seek shelter (if adequate advance warning is given); 2) remain inside the building and sit away from any windows; and 3) lie down and curl up. All other field personnel should exit the trailers and seek shelter until the weather improves. Do not seek shelter under

the trailers under and circumstances. If no warning is provided, personnel should leave the trailers and lie face down in low lying grassy areas away from the trailers or under any available box (moving) trucks located at the parking lot.

Tornado - Vacate trailers, automobiles, seek building/shelter on/above ground
Severe T-storm - Lightning - avoid tall trees, metal objects, towers, fences, creek beds
Flash flood - seek higher ground

12.0 CONFINED SPACE

A confined space is defined as a space or work area not designed or intended for normal human occupancy, having limited means of access and poor natural ventilation, and or any structure, including buildings or rooms which have limited means of egress. Examples include tanks, vats, and basements. If a confined space entry is conducted, it will be done in accordance with applicable OSHA standards.

The SSO will evaluate any confined space to determine if it is a Permit Required Confined Space (PRCS). If it is a Permit Confined Space, the SSO will perform a hazard evaluation and identify means of entry, work to be completed, exit procedures, emergency exit procedures, needed equipment, and assigned personnel. The PRCS-permit will be completed to reflect this evaluation. The Permit will be authorized by the RM and reviewed with the FOSC. The Permit, Entry Plan and SOP will be discussed with personnel assigned to the task (i.e. entrants, standbys, supervisor, and emergency responders). The fire department must be notified in advance if they are to be emergency responders. The permit will be valid for only one shift and one task. The permits will be maintained with site safety files.

Type of Confined Space	Location of Site	Comments
LIST ON SITE.		

A

ATTACHMENT A

SITE SAFETY PLAN AMENDMENTS

SITE SAFETY PLAN AMENDMENT: #__ : _____

SITE NAME: _____

DATE: _____

TYPE OF AMENDMENT: _____

REASON FOR AMENDMENT: _____
_____
_____

ALTERNATE SAFEGUARD PROCEDURES: _____
_____
_____

REQUIRED CHANGES IN PPE: _____
_____
_____

_____	_____	_____	_____
ERRS Response Manager	(Date)	ERRS Safety Manager	(Date)
_____	_____	_____	
Lead START Member	(Date)	E&E RSO	(Date)
_____	_____	_____	
U.S. EPA FOSC	(Date)	ERRS Safety Manager (Team Subcontractor)	(Date)

ATTACHMENT B

SITE MAPS

Victory Memorial Hospital
1324 N. Sheridan Rd
Waukegan, IL
(847) 360-3000

- **E SEA HORSE DR** 0.4
- Turn Right on **E CLAYTON ST** 0.1
- Turn Right on **PERSHING RD** 0.1
- Turn Left on **MATHON DR** 0.2
- Turn Right on **N SHERIDAN RD** 1.0
- **Distance:** 1.8 miles **Approximate Travel Time:** 6 mins

ATTACHMENT C

CHEMICAL HAZARD INFORMATION

NIOSH Pocket Guide to Chemical Hazards

Lead	**CAS** 7439-92-1
Pb	**RTECS** OF7525000
Synonyms & Trade Names Lead metal, Plumbum	**DOT ID & Guide**

Exposure Limits	NIOSH REL*: TWA 0.050 mg/m^3 See Appendix C [*Note: The REL also applies to other lead compounds (as Pb) -- see Appendix C.]
	OSHA PEL*: [1910.1025] TWA 0.050 mg/m^3 See Appendix C [*Note: The PEL also applies to other lead compounds (as Pb) -- see Appendix C.]

IDLH 100 mg/m^3 (as Pb) See: 7439921	**Conversion**

Physical Description
A heavy, ductile, soft, gray solid.

MW: 207.2	BP: 3164°F	MLT: 621°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 11.34
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form.

Incompatibilities & Reactivities
Strong oxidizers, hydrogen peroxide, acids

Measurement Methods
NIOSH 7082, 7105, 7300, 7700, 7701, 7702; OSHA ID121, ID125G, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: Daily Remove: When wet or contaminated Change: Daily	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA

Up to 0.5 mg/m^3: (APF = 10) Any air-purifying respirator with a high-efficiency particulate filter/(APF = 10) Any supplied-air respirator

Up to 1.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter

Up to 2.5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode

Up to 100 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Lassitude (weakness, exhaustion), insomnia; facial pallor; anorexia, weight loss, malnutrition; constipation, abdominal pain, colic; anemia; gingival lead line; tremor; paralysis wrist, ankles; encephalopathy; kidney disease; irritation eyes; hypotension

Target Organs Eyes, gastrointestinal tract, central nervous system, kidneys, blood, gingival tissue

See also: INTRODUCTION See ICSC CARD: 0052 See MEDICAL TESTS: 0127

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NIOSH Pocket Guide to Chemical Hazards

Mercury (organo) alkyl compounds (as Hg)

CAS

RTECS

Synonyms & Trade Names
Synonyms vary depending upon the specific (organo) alkyl mercury compound.

DOT ID & Guide

Exposure Limits

NIOSH REL: TWA 0.01 mg/m^3 ST 0.03 mg/m^3 [skin]

OSHA PEL†: TWA 0.01 mg/m^3 C 0.04 mg/m^3

IDLH 2 mg/m^3 (as Hg) See: merc-hg

Conversion

Physical Description
Appearance and odor vary depending upon the specific (organo) alkyl mercury compound.

Properties vary depending upon the specific (organo) alkyl mercury compound.			

Incompatibilities & Reactivities
Strong oxidizers such as chlorine

Measurement Methods
None available
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily
Provide: Eyewash, Quick drench

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 0.1 mg/m^3: (APF = 10) Any supplied-air respirator
Up to 0.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode
Up to 0.5 mg/m^3: (APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 2 mg/m^3: (APF = 1000) Any supplied-air respirator operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Paresthesia; ataxia, dysarthria; vision, hearing disturbance; spasticity, jerking limbs; dizziness; salivation; lacrimation (discharge of tears); nausea, vomiting, diarrhea, constipation; skin burns; emotional disturbance; kidney injury; possible teratogenic effects

Target Organs Eyes, skin, central nervous system, peripheral nervous system, kidneys

See also: INTRODUCTION See MEDICAL TESTS: 0135

NIOSH Pocket Guide to Chemical Hazards

Chlorodiphenyl (54% chlorine)	CAS 11097-69-1
$C_6H_3Cl_2C_6H_2Cl_3$ (approx)	RTECS TQ1360000
Synonyms & Trade Names Aroclor® 1254, PCB, Polychlorinated biphenyl	**DOT ID & Guide** 2315 171

Exposure Limits	NIOSH REL*: Ca TWA 0.001 mg/m^3 See Appendix A [*Note: The REL also applies to other PCBs.]
	OSHA PEL: TWA 0.5 mg/m^3 [skin]

IDLH Ca [5 mg/m^3] See: IDLH INDEX	**Conversion**

Physical Description
Colorless to pale-yellow, viscous liquid or solid (below 50°F) with a mild, hydrocarbon odor.

MW: 326 (approx)	BP: 689-734°F	FRZ: 50°F	Sol: Insoluble
VP: 0.00006 mmHg	IP: ?		Sp.Gr(77°F): 1.38
Fl.P: NA	UEL: NA	LEL: NA	

Nonflammable Liquid, but exposure in a fire results in the formation of a black soot containing PCBs, polychlorinated dibenzofurans, and chlorinated dibenzo-p-dioxins.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 5503; OSHA PV2088
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: Daily Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, chloracne; liver damage; reproductive effects; [potential occupational carcinogen]

Target Organs Skin, eyes, liver, reproductive system

Cancer Site [in animals: tumors of the pituitary gland & liver, leukemia]

See also: INTRODUCTION See ICSC CARD: 0939 See MEDICAL TESTS: 0176

NIOSH Pocket Guide to Chemical Hazards

Toluene	**CAS** 108-88-3
$C_6H_5CH_3$	**RTECS** XS5250000
Synonyms & Trade Names Methyl benzene, Methyl benzol, Phenyl methane, Toluol	**DOT ID & Guide** 1294 130

Exposure Limits	NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
	OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
IDLH 500 ppm See: 108883	**Conversion** 1 ppm = 3.77 mg/m^3

Physical Description
Colorless liquid with a sweet, pungent, benzene-like odor.

MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%
VP: 21 mmHg	IP: 8.82 eV		Sp.Gr: 0.87
Fl.P: 40°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500, 1501, 3800, 4000; OSHA 111
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0078 See MEDICAL TESTS: 0232

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NIOSH Pocket Guide to Chemical Hazards

2-Butanone	CAS 78-93-3
$CH_3COCH_2CH_3$	RTECS EL6475000
Synonyms & Trade Names Ethyl methyl ketone, MEK, Methyl acetone, Methyl ethyl ketone	**DOT ID & Guide** 1193 127 1232 127

Exposure Limits	NIOSH REL: TWA 200 ppm (590 mg/m^3) ST 300 ppm (885 mg/m^3)
	OSHA PEL†: TWA 200 ppm (590 mg/m^3)

IDLH 3000 ppm See: 78933	Conversion 1 ppm = 2.95 mg/m^3

Physical Description
Colorless liquid with a moderately sharp, fragrant, mint- or acetone-like odor.

MW: 72.1	BP: 175°F	FRZ: -123°F	Sol: 28%
VP: 78 mmHg	IP: 9.54 eV		Sp.Gr: 0.81
Fl.P: 16°F	UEL(200°F): 11.4%	LEL(200°F): 1.4%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, amines, ammonia, inorganic acids, caustics, isocyanates, pyridines

Measurement Methods
NIOSH 2500, 3800; OSHA 16, 84, 1004
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water wash immediately Breathing: Fresh air Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 3000 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)£/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose; headache; dizziness; vomiting; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0179 See MEDICAL TESTS: 0133

NIOSH Pocket Guide to Chemical Hazards

Silver (metal dust and soluble compounds, as Ag)

CAS 7440-22-4 (metal)

Ag (metal)

RTECS VW3500000 (metal)

Synonyms & Trade Names
Silver metal: Argentum
Synonyms of soluble silver compounds such as Silver nitrate ($AgNO_3$) vary depending upon the specific compound.

DOT ID & Guide

Exposure Limits

NIOSH REL: TWA 0.01 mg/m^3

OSHA PEL: TWA 0.01 mg/m^3

IDLH 10 mg/m^3 (as Ag) See: IDLH INDEX

Conversion

Physical Description
Metal: White, lustrous solid.

MW: 107.9	BP: 3632°F	MLT: 1761°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 10.49 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid, but flammable in form of dust or powder.

Incompatibilities & Reactivities
Acetylene, ammonia, hydrogen peroxide, bromoazide, chlorine trifluoride, ethyleneimine, oxalic acid, tartaric acid

Measurement Methods
NIOSH 7300; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated ($AgNO_3$)
Change: Daily
Provide: Eyewash

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 0.25 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode[£]/(APF = 25) Any powered, air-purifying respirator with a high-efficiency particulate filter[£]
Up to 0.5 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 10 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Blue-gray eyes, nasal septum, throat, skin; irritation, ulceration skin; gastrointestinal disturbance

Target Organs Nasal septum, skin, eyes

See also: INTRODUCTION See ICSC CARD: 0810 See MEDICAL TESTS: 0208

NIOSH Pocket Guide to Chemical Hazards

Chromium metal	**CAS** 7440-47-3
Cr	**RTECS** GB4200000
Synonyms & Trade Names Chrome, Chromium	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 0.5 mg/m^3 See Appendix C
	OSHA PEL*: TWA 1 mg/m^3 See Appendix C [*Note: The PEL also applies to insoluble chromium salts.]

IDLH 250 mg/m^3 (as Cr) See: 7440473	**Conversion**

Physical Description
Blue-white to steel-gray, lustrous, brittle, hard, odorless solid.

MW: 52.0	BP: 4788°F	MLT: 3452°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 7.14
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid in bulk form, but finely divided dust burns rapidly if heated in a flame.

Incompatibilities & Reactivities
Strong oxidizers (such as hydrogen peroxide), alkalis

Measurement Methods
NIOSH 7024; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: No recommendation Eyes: No recommendation Wash skin: No recommendation Remove: No recommendation Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
Up to 2.5 mg/m^3: (APF = 5) Any dust and mist respirator*
Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators*/(APF = 10) Any supplied-air respirator*
Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter*
Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 250 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin; lung fibrosis (histologic)

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0029 See MEDICAL TESTS: 0052

NIOSH Pocket Guide to Chemical Hazards

Ethyl benzene	**CAS** 100-41-4
$CH_3CH_2C_6H_5$	**RTECS** DA0700000
Synonyms & Trade Names Ethylbenzol, Phenylethane	**DOT ID & Guide** 1175 129

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 125 ppm (545 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 800 ppm [10%LEL] See: 100414	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 277°F	FRZ: -139°F	Sol: 0.01%
VP: 7 mmHg	IP: 8.76 eV		Sp.Gr: 0.87
Fl.P: 55°F	UEL: 6.7%	LEL: 0.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1501; OSHA 7, 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush promptly Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 800 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0268 See MEDICAL TESTS: 0098

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NIOSH Pocket Guide to Chemical Hazards

Cadmium dust (as Cd)

CAS 7440-43-9 (metal)

Cd (metal)

RTECS EU9800000 (metal)

Synonyms & Trade Names
Cadmium metal: Cadmium
Other synonyms vary depending upon the specific cadmium compound.

DOT ID & Guide
2570 154 (compounds)

Exposure Limits

NIOSH REL*: Ca See Appendix A [*Note: The REL applies to all Cadmium compounds (as Cd).]

OSHA PEL*: [1910.1027] TWA 0.005 mg/m^3 [*Note: The PEL applies to all Cadmium compounds (as Cd).]

IDLH Ca [9 mg/m^3 (as Cd)] See: IDLH INDEX

Conversion

Physical Description
Metal: Silver-white, blue-tinged lustrous, odorless solid.

MW: 112.4	BP: 1409°F	MLT: 610°F	Sol: Insoluble
VP: 0 mmHg (approx)	IP: NA		Sp.Gr: 8.65 (metal)
Fl.P: NA	UEL: NA	LEL: NA	

Metal: Noncombustible Solid in bulk form, but will burn in powder form.

Incompatibilities & Reactivities
Strong oxidizers; elemental sulfur, selenium & tellurium

Measurement Methods
NIOSH 7048; OSHA ID121, ID125G, ID189, ID206
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: No recommendation
Eyes: No recommendation
Wash skin: Daily
Remove: No recommendation
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion

Symptoms Pulmonary edema, dyspnea (breathing difficulty), cough, chest tightness, substernal (occurring beneath the sternum) pain; headache; chills, muscle aches; nausea, vomiting, diarrhea; anosmia (loss of the sense of smell), emphysema, proteinuria, mild anemia; [potential occupational carcinogen]

Target Organs respiratory system, kidneys, prostate, blood

Cancer Site [prostatic & lung cancer]

See also: INTRODUCTION See ICSC CARD: 0020 See MEDICAL TESTS: 0035

NIOSH Pocket Guide to Chemical Hazards

Barium chloride (as Ba)

CAS 10361-37-2

$BaCl_2$

RTECS CQ8750000

Synonyms & Trade Names
Barium dichloride

DOT ID & Guide
1564 154 (barium compounds, n.o.s.)

Exposure Limits

NIOSH REL*: TWA 0.5 mg/m^3 [*Note: The REL also applies to other soluble barium compounds (as Ba) except Barium sulfate.]

OSHA PEL*: TWA 0.5 mg/m^3 [*Note: The PEL also applies to other soluble barium compounds (as Ba) except Barium sulfate.]

IDLH 50 mg/m^3 (as Ba) See: IDLH INDEX

Conversion

Physical Description
White, odorless solid.

MW: 208.2	BP: 2840°F	MLT: 1765°F	Sol: 38%
VP: Low	IP: ?		Sp.Gr: 3.86
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Solid

Incompatibilities & Reactivities
Acids, oxidizers

Measurement Methods
NIOSH 7056; OSHA ID121
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection

Respirator Recommendations NIOSH/OSHA

Up to 5 mg/m^3: (APF = 10) Any dust and mist respirator except single-use and quarter-mask respirators/(APF = 10) Any supplied-air respirator

Up to 12.5 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode/(APF = 25) Any powered, air-purifying respirator with a dust and mist filter

Up to 25 mg/m^3: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/(APF = 50) Any supplied-air respirator that has a tight-fitting facepiece and is operated in a continuous-flow mode/(APF = 50) Any powered, air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece

Up to 50 mg/m^3: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode

Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus

Escape: (APF = 50) Any air-purifying, full-facepiece respirator with a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, upper respiratory system; skin burns; gastroenteritis; muscle spasm; slow pulse, extrasystoles; hypokalemia

Target Organs Eyes, skin, respiratory system, heart, central nervous system

International Chemical Safety Cards

METHYL ISOBUTYL KETONE

ICSC: 0511

4-Methyl-2-pentanone
Isopropylacetone
Hexone
$C_6H_{12}O$ / $CH_3COCH_2CH(CH_3)_2$
Molecular mass: 100.2

ICSC # 0511
CAS # 108-10-1
RTECS # SA9275000
UN # 1245
EC # 606-004-00-4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		PREVENT GENERATION OF MISTS!	
•INHALATION	Cough. Diarrhoea. Dizziness. Headache. Nausea. Sore throat. Unconsciousness. Vomiting. Weakness. Loss of appetite.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	Dry skin. Redness. Pain.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Redness. Pain.	Safety spectacles.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. (Further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Ventilation. Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place (extra personal protection: filter respirator for organic gases and vapours).	Fireproof. Separated from strong oxidants. Well closed.	Airtight. F symbol R: 11 S: 2-9-16-23-33 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0511

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1998. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

METHYL ISOBUTYL KETONE

ICSC: 0511

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR. **PHYSICAL DANGERS:** The vapour mixes well with air, explosive mixtures are easily formed. **CHEMICAL DANGERS:** The substance can form explosive peroxides upon exposure to air. Reacts violently with strong oxidants and reducing agents. **OCCUPATIONAL EXPOSURE LIMITS:** TLV (as TWA): 50 ppm; 205 mg/m^3; (as STEL): 75 ppm; 307 mg/m^3 (ACGIH 1997). OSHA PEL: TWA 100 ppm (410 mg/m^3) NIOSH REL: TWA 50 ppm (205 mg/m^3) ST 75 ppm (300 mg/m^3) NIOSH IDLH: 500 ppm **ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of its vapour and by ingestion. **INHALATION RISK:** A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20° C. **EFFECTS OF SHORT-TERM EXPOSURE:** The substance and the vapour irritates the eyes, the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system at high concentrations , resulting in narcosis. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact with skin may cause dermatitis.
PHYSICAL PROPERTIES	Boiling point: 117-118°C Melting point: -84.7°C Relative density (water = 1): 0.80 Solubility in water, g/100 ml at 20°C: 1.91 Vapour pressure, kPa at 20°C: 2.1 Relative vapour density (air = 1): 3.45 Flash point: 14°C c.c. Auto-ignition temperature: 460°C Explosive limits, vol% in air: 1.4-7.5 Octanol/water partition coefficient as log Pow: 1.38
ENVIRONMENTAL DATA	

NOTES

MIBK is commonly used name. Check for peroxides prior to distillation; eliminate if found.

Transport Emergency Card: TEC (R)-610
NFPA Code: H2; F3; R0;

ADDITIONAL INFORMATION

ICSC: 0511 **METHYL ISOBUTYL KETONE**

(C) IPCS, CEC, 1998

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NIOSH Pocket Guide to Chemical Hazards

p-Xylene	CAS 106-42-3
$C_6H_4(CH_3)_2$	RTECS ZE2625000
Synonyms & Trade Names 1,4-Dimethylbenzene; para-Xylene; p-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 900 ppm See: 95476	Conversion 1 ppm = 4.41 mg/m^3

Physical Description
Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]

MW: 106.2	BP: 281°F	FRZ: 56°F	Sol: 0.02%
VP: 9 mmHg	IP: 8.44 eV		Sp.Gr: 0.86
Fl.P: 81°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0086 See MEDICAL TESTS: 0243

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NIOSH Pocket Guide to Chemical Hazards

m-Xylene	**CAS** 108-38-3
$C_6H_4(CH_3)_2$	**RTECS** ZE2275000
Synonyms & Trade Names 1,3-Dimethylbenzene; meta-Xylene; m-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: 95476	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 282°F	FRZ: -54°F	Sol: Slight
VP: 9 mmHg	IP: 8.56 eV		Sp.Gr: 0.86
Fl.P: 82°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash promptly Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0085 See MEDICAL TESTS: 0243

NIOSH Pocket Guide to Chemical Hazards

o-Xylene	CAS 95-47-6
$C_6H_4(CH_3)_2$	RTECS ZE2450000
Synonyms & Trade Names 1,2-Dimethylbenzene; ortho-Xylene; o-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: 95476	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 292°F	FRZ: -13°F	Sol: 0.02%
VP: 7 mmHg	IP: 8.56 eV		Sp.Gr: 0.88
Fl.P: 90°F	UEL: 6.7%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0084 See MEDICAL TESTS: 0243

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D

ATTACHMENT D

PERSONAL PROTECTIVE EQUIPMENT
AND
RESPIRATORY PROTECTION SOP'S

INSPECTION OF PERSONAL PROTECTIVE CLOTHING

[1] Determine that clothing material is correct for specified task
- a. compatibility chart
- b. chemical hazard chart in Safety Plan
- c. MSDS

[2] Visually inspect material for:
- a. imperfect seams
- b. non-uniform coatings
- c. tears
- d. discoloration/degradation
- e. malfunctioning closures

[3] Hold up to light and check for pinholes.

[4] Flex material:
- a. observe for cracks
- b. other signs of shelf deterioration

[5] If the material has been used previously, inspect inside and out for signs of chemical penetration/degradation
- a. discoloration
- b. swelling
- c. stiffness

[6] During the work task:
- a. evidence of discoloration/degradation
- b. closure failure
- c. tears
- d. punctures
- e. seam discontinuities

RESPIRATORY PROTECTION

General Guidelines

[1] All personnel required to use respirators will select and use the respirators based upon guidelines established by OSHA, NIOSH, and the Superior Respiratory Protection Program.

[2] All individuals required to wear respirators will have received a documented pre-issue qualitative fit test for the full-face.

[3] Each individual will be responsible for conducting a positive/negative fit check each time the respirator is donned.

[4] Each individual shall be responsible for cleaning his/her own respirator at least once daily and is permitted to leave the work area to wash his/her own respirator as needed.

[5] Cartridges or filters shall be changed after each daily use or whenever an increase in breathing resistance/odor is detected, or if they become wet. All changes will be made in uncontaminated areas.

[6] No field employee shall wear a respirator until he/she has been examined by a physician and determined to be physically able to wear respiratory protection. This examination shall be documented at the site.

[7] All personnel must be qualitively fit test every six months.

Air Purifying Respirator Inspection and Checkout

[1] Visually inspect the entire unit for any obvious damages, defects, or deteriorated rubber.

[2] Make sure the facepiece harness is not damaged.

[3] Inspect lens for damage and proper seal in facepiece.

[4] Exhalation Valve
Pull off plastic cover and check valve for debris, tears, or deformities in the neoprene valve.

[5] Inhalation Valve
Screw off cartridges/canister and visually inspect neoprene valves for tears. Make sure than inhalation valves and cartridge receptacle gaskets are in place.

[6] Insure that the speaking diaphragm retainer ring is hand tight.

[7] Make sure than you have the correct cartridge.

[8] Don and perform positive and negative pressure check.

Storage of Air Purifying Respirators

[1] OSHA requires that respirators be stored to protect against:

* Dust
* Sunlight
* Heat
* Extreme Cold
* Excessive Moisture
* Damaging Chemicals
* Mechanical Damage

[2] Respirators must be stored in a clean area which is not likely to be contaminated by the work in progress.

[3] Respirators should not be hung from their headbands for prolonged periods of time.

SCBA Inspection and Checkout

[1] Monthly Inspection

a. check cylinder label for current hydrostatic test date
b. inspect cylinder for large dent or gouges
c. inspect cylinder gauge for damage
d. complete routine inspection
e. fill out inspection documentation card

[2] Routine Inspection

a. Pre-Operational
   * high-pressure hose connector is tight on cylinder fitting
   * by-pass valve is closed
   * mainline valve is closed
   * regulator outlet is not covered or obstructed

b. Backpack and Harness Assembly
   * inspect backpack/harness straps for wear, damage, secure
   * check wear and function of belts
   * check backplate and cylinder holder for damage

c. Cylinder and High Pressure Hose Assembly
   * check cylinder to insure firmly attached to backplate
   * open cylinder valve; listen or feel for leakage around packing and hose connection
   * check high pressure hose for damage or leaks

d. Regulator
   * cover regulator outlet with palm of hand
   * open mainline valve
   * remove hand from regulator outlet
   * open by-pass valve slowly to assure proper function
   * close by-pass valve
   * open mainline valve
   * note pressure reading on regulator gauge
   * close cylinder valve while keeping hand over regulator outlet
   * slowly remove hand from outlet and allow air to flow
   * note pressure when low pressure warning alarm sounds; it should be 550-650 psi
   * close mainline valve
   * check regulator for leaks by blowing air into regulator for 5-10 seconds
   * draw air from outlet for 5-10 seconds
   * if a positive pressure or vacuum cannot be maintained, there is a leak.

e. Facepiece & Corrugated Breathing Hose
   * inspect head harness and facepiece for damage, serrations, and deteriorated rubber
   * inspect lens for damage and proper seal in facepiece
   * inspect exhalation valve for damage and dirt buildup
   * stretch breathing hose and carefully and inspect for holes and deterioration
   * inspect connector for damage and presence of washer
   * perform negative pressure test with facepiece donned

f. Storage
   * refill cylinder to 2216 psi
   * close cylinder valve
   * tightly connect high pressure hose to cylinder
   * bleed pressure from high pressure hose by opening mainline valve
   * close by-pass valve
   * close mainline valve
   * fully extend all straps
   * store facepiece in a clean plastic bag for protection

ATTACHMENT E

ACCIDENT REPORTING/INVESTIGATION

- All injuries or accidents must be reported to the Response Manager or Site Safety Officer immediately.

- The Response Manager will conduct an immediate investigation of the accident and document all results on the Supervisor's Accident Investigation Report and State Worker's Compensation Form.

- The Response Manager will assign a supervisory individual to accompany all injured personnel to the clinic.

- Copies of all Supervisor's Accident Reports will be sent to the ERRS PM, ERRS DPM, and the ERRS Safety Manager (Team Subcontractor).

ATTACHMENT F

SITE WALKTHROUGHS/ENTRY

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Site Walkthroughs**	**Document No.**	**61**
Date of Issue:	**November 1999**	**Revision No.**	**1**
Approval		**Approval**	

TASK SAFETY AND HEALTH RISK ANALYSIS

This Hazard Assessment identifies the general hazards associated with site operations. Every effort must be made to reduce or eliminate these hazards. Those which cannot be eliminated must be guarded against by use of engineering controls and/or personal protective equipment.

1.0 HAZARDS

- Slip, trip, fall hazard from debris scattered throughout buildings, unstable stairways, and drum/containers in buildings.
- Slip, trip, fall hazards associated with general site operations.
- Injury from unstable overhead and falling building materials/debris.
- Gas release hazards due to the compressed gas cylinders.
- Direct skin contact and/or inhalation of contaminants.
- Biological hazards from uncultivated areas such as vermin, bees, poison ivy, poison oak, and ticks.

2.0 SOPs

- Be sure that all areas of entry have been provided with adequate lighting.
- Be sure that all manholes/floor drains in buildings are covered and marked.

- Be sure that stairways are structurally sound prior to work.
- Be sure that all rooms are checked for loose or unstable overhead structures/debris prior to commencement of work activities.
- Slip, trip, fall hazards can be minimized by keeping clean, organized work areas and being aware of unstable or loose footing areas.
- Air monitoring should be conducted prior to walkthrough.
- Wear proper level of protection when inside the hot zone area.
- Be aware of and avoid potential biological hazards as stated above. Personnel should check for ticks upon exiting hot zone area.

ATTACHMENT G

HAZARDOUS WASTE STORAGE

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Hazardous Waste Storage**	**Document No.**	**30**
Date of Issue:	**November 1999**	**Revision No.**	**2**
Approval		**Approval**	

1.0 PACKAGING, LABELING, AND STORAGE OF MATERIAL

EQ ensures the use of proper containers with proper labeling by following the packaging and labeling requirements defined in the work plan. The present regulations for packaging of wastes are being revised. Currently either the Hazardous Materials Rule 181 specifications or the Performance Oriented Packaging method for packaging is acceptable and EQ can perform both methods. The proposed packaging method must be specified in the delivery order to ensure the proper packaging, labels, and placards are available for project initiation. The type of packaging required is specified in the "Hazardous Materials Table," 49 CFR 172.101, Column 8 in the HM 181 table and Column 5 in the present regulations.

Each regional transportation and disposal coordinator and on-site transportation and disposal coordinator is equipped with a copy of the hazardous materials table applicable to the delivery order. Each table also specified DOT shipping names, label requirements, special provisions, and limited quantities for aircraft and water vessels.

To ensure the containers are properly labeled prior to shipment, a Preshipment Certification Form (Figure 1) and a Drummed Waste Preshipment Checklist (Figure 2) are completed and certified by the on-site transportation and disposal coordinator prior to shipment. The "product code" is the alpha-numeric designation assigned by the receiving TSDF to track the shipment once it arrives at the facility. Proper labeling is important because a TSDF will not accept material improperly marked.

2.0 PROPER STORAGE OF WASTE

Storage of waste on a non-permitted facility falls under the jurisdiction of the USEPA. State agencies also regulate environmental programs to at least the

same extent as the USEPA. The USEPA regulations are the focus of this section, since state regulations vary widely and must be at least as stringent as federal regulations.

To determine the applicable storage regulations, EQ first determines the generator's status. The "accumulation time" factor determines if they are an exempt, small-quantity generator; a small-quantity generator; a generator storing for less than 90 days; or a generator requiring a storage permit. For all generators, the accumulation time begins when the first drop of known hazardous waste enters a drum. For material of unknown status, EQ performs chemical analysis per USEPA and/or state requirements. The accumulation time starts when the tests are complete and the analytical data show that the waste is hazardous. Once the drum/container is full, the status of the generator determines the length of time the drum/container may remain at this filling location.

To aid in complying with the regulations, EQ has developed a Weekly Inspection Form (see Figure 3) for use by the on-site transportation and disposal coordinator or another designee of the generator. The form is completed by the inspector and filed for verification that all storage requirements identified in the proposal or technical plans (WP, CSAP, and SSHP) were maintained and the containers were labeled correctly.

EQ PRESHIPMENT CERTIFICATION FORM

DATE: ___/___/___ TIME: ____:____ PROJECT #_____ TRACKING #: _____

Y/N/NA	INITIALS	
_____	_____	Vehicle is in good condition, DOT ID # on side
_____	_____	Drum preshipment check list completed
_____	_____	Load secured (tarp in place and good condition, drums stable, liner in place)
_____	_____	Placards legible and in place
_____	_____	Manifest completed properly
_____	_____	Transporter signed, printed name, and dated manifest
_____	_____	Generator signed, printed name, and dated manifest
_____	_____	Bottom copy given to generator
_____	_____	Land Disposal Restriction Notification attached to manifest
_____	_____	License number, vehicle number of vehicle recorded
_____	_____	Manifest Document # and State Document # recorded
_____	_____	Date and time of shipment logged

Comments:

_____

_____

_____

_____

Name of EQ Responsible Party: _____ Employee #: _____

Signature: _____

Figure 1. Preshipment Certification Form

DRUMMED WASTE PRESHIPMENT CHECK LIST

Y/N/NA	INITIALS	
_____	_____	Assigned manifest document number
_____	_____	Correct drum count
_____	_____	Estimated total volume/weight
_____	_____	Manifest document number is on haz-waste label
_____	_____	Hazardous waste label is on upper one-third side of drum.
_____	_____	Non-regulated waste label is on upper one-third side of drum.
_____	_____	_____ DOT label is next to waste label.
_____	_____	ORM-E Mark (in rectangle) or label is next to waste label.
_____	_____	Product code _____ is on top and side of drums.
_____	_____	Drum has no void space.
_____	_____	Drum contains no free liquids.
_____	_____	Drums are secured in truck
_____	_____	Drum numbers of all containers are recorded.

EQ Responsible Party: _____ Employee #: _____

Signature: _____

Figure 2. Drummed Waste Preshipment Check List

	WEEKLY INSPECTION FORM	Project Number: _____ Project Name: _____ T & D COORDINATOR: _____

This inspection is required by state and federal regulations (40 CFR, Part 265.174)

STAGING AREA ID: _____ | # OF CONTAINERS: _____ | DOCUMENT #: _____

THE DOCUMENT NUMBER IS SPECIFIC FOR THIS STAGING AREA. THE NUMBERS INDICATES THE NUMBER OF TIMES THE AREA HAS BEEN INSPECTED.

All containers have been visually inspected for:

1. Evidence of leaking: YES ☐ NO ☐
   ID of container(s) leaking: _____
   Corrective actions: _____
2. Evidence of deterioration: YES ☐ NO ☐
   ID of container(s) corroding: _____
   Corrective actions: _____
3. Bulging: YES ☐ NO ☐
   ID of container(s) bulging: _____
   Corrective actions: _____
4. Fuming: YES ☐ NO ☐
   ID of container(s) fuming: _____
   Corrective actions: _____
5. Labels properly placed, visible and legible: YES ☐ NO ☐
   Corrective actions: _____

The following operation were required to insure adequate aisle space clear of obstructions.

The range of accumulation dates in this area are ____/____/____ to ____/____/____
The following containers required restaging to ensure proper segregation.

YES	NO	
		No smoking and hazardous waste signs in place and clean?
		Spill control equipment in place?
		Communication devices working?

DATE TIME SIGNATURE

Note: Any deficiencies noted must be brought to the attention of the hazardous waste emergency coordinator on site for immediate action.

Figure 3. Weekly Inspection Form

ATTACHMENT H

HIGH PRESSURE WATER CLEANUP

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**High Pressure Washers**	**Document No.**	**31**
Date of Issue:	**November 1999**	**Revision No.**	**2**
Approval		**Approval**	

1.0 OBJECTIVE

Environmental Quality Management, Inc. (EQ) personnel who have been trained in the proper setup, use, and care of high-pressure washers will be authorized to operate this equipment.

2.0 PURPOSE

This procedure describes requirements for the safe operation of the high-pressure washer.

3.0 PERSONAL PROTECTIVE EQUIPMENT

The following equipment will be worn by operators and assistants:

- Safety shoes or boots
- Metal foot and shin guards
- Eye protection (goggles and face shields)
- Hard hat
- Heavy-duty PVC rain suit or equivalent
- Heavy chemical-resistant gloves

4.0 OPERATION PROCEDURE

- Only trained, authorized personnel will operate the high-pressure washer.
- The lance must always be pointed at the work area.
- The operator must maintain good footing.

- The operator must have an assistant to aid in moving the hose to different areas and to back up the operator. The assistant must remain in back of the operator.

- Non-operators must remain a safe distance from the operator. The distance must be a minimum of 25 feet.

- The operating pressure should never exceed that which is necessary to complete the job.

- No authorized attachment may be made to the unit. (The trigger should never be tied down.)

- The operator should be relieved at frequent intervals to avoid fatigue (at least hourly).

- Equipment should be cleaned often to avoid oil or dirt build-up, especially around the trigger and guard area.

- An assistant should always be standing by at the pressure generator to shut down the equipment and monitor the pressure.

- All users must be trained in emergency shutdown procedures and general equipment maintenance.

- All lances must be made of seamless <u>stainless steel</u>. Do not use carbon steel which can corrode and result in weakening of the lance.

- <u>DO NOT MODIFY THE LANCE</u>. The lance barrel, from trigger block to the tip, should not be less than <u>48 inches</u> as recommended by manufacturers of hydroblasting equipment.

- Always increase pressure slowly to inspect for leaks. All leaks or malfunctioning equipment must be repaired immediately or the unit taken out-of-service. Never exceed the operating pressure necessary to do the job.

- Attach a cable which connects the water supply hose to the laser wand to prevent whipping should they accidentally disconnect.

- A serious risk of infection and further complications is possible from a hydroblasting laceration. If an injection injury is suspected, the treating physician should be informed so he/she can request a surgeon who specializes in injection injuries. The specialist may have to perform surgery on the affected body part in order to remove the material (oil, particles) that was injected directly through the skin.

ATTACHMENT I

WORKING AROUND HEAVY EQUIPMENT

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Working Around Heavy Equipment and Machinery (Excavators/Loaders)**	**Document No.**	**79**
Date of Issue:	**November 1999**	**Revision No.**	**1**
Approval		**Approval**	

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The hazards associated with the operation of heavy equipment are injury to personnel, equipment damage, and property damage. The potential for injury or damage to personnel and property is due to the size of the equipment; limited visibility of the driver; the potential overhead hazards leading to crushing, tripping, falls, cuts, or punctures; and the high noise levels created by the equipment.

1.0 General

- The work area shall be appropriately delineated to prevent non-essential personnel from wandering into the area.
- Equipment operators shall maintain eye contact with ground personnel at all times, giving ground personnel the right of way.
- Vehicles/equipment paths shall be marked as feasible to prevent personnel from crossing.
- Equipment shall be outfitted with the appropriate safety features, back-up alarms, rollover protection, fire extinguishers, etc.
- Loads shall be lowered and equipment de-energized and secured before any adjustments are made to load, repositioning, etc.
- Personnel shall be cognizant of excavations, material/debris piles and other equipment in the work area. These areas shall be appropriately marked or protected to prevent falls.

2.0 EXCAVATORS/LOADERS

- Only trained and qualified individuals shall operate heavy equipment/excavators.
- All heavy equipment shall be inspected before mobilization, while on site, and daily prior to use; inspections shall be documented.
- All heavy equipment shall be equipped with the appropriate safety devices [ROPS, fire extinguishers, seat belts, backup alarms, (etc.)].
- Vehicles shall maintain appropriate operating speeds and load capacities at all times.
- A spotter shall be used for each piece of heavy equipment to assist the operator and nearby personnel in preventing injuries. The spotter shall carry an emergency signal/alarm at all times during work operations.
- The area of excavation (or other operation) shall be appropriately marked to prevent non-essential personnel from wandering into the vehicle path (safe work buffer zone).
- Ground personnel shall be given the right of way at all times. Safety vests, and/or reflective clothing shall be worn by those working in the immediate area. Eye contact shall be maintained between operators and laborers in the vicinity.
- Radio contact shall be maintained between operators and the appropriate on-site personnel.
- At the end of the day, equipment breathing air and safety equipment shall be checked, the cab shall be cleaned, refueling will occur, brakes will be set, and a daily report shall be completed by the equipment operator.
- The area shall be visually inspected and all structural encumbrances shall be removed or protected prior to work.
- Personnel shall enter and exit vehicles using handrails and steps that are provided.
- Work area shall be kept neat and in an orderly state of housekeeping.
- All underground utilities shall be located prior to excavation; utility companies shall be contacted if necessary.

- Excavators shall be prohibited from operating on severe inclines or questionable surfaces. Excavators operating near the edge of a quarry shall be supported with a swamp pad.

- Employees shall be prohibited from standing or working in areas where they would be exposed to falling loads. Personnel shall stand away from vehicles during excavation or loading. Operators may remain within vehicle cabs during loading as outlined in 29 CFR 1926.601(b)(6) for adequate protection.

- All personnel working around the excavators shall be trained in emergency shutdown of the equipment.

- Stop logs/railroad ties shall be used to barricade a quarry rim to prevent equipment or personnel from coming too close to the edge. Barricade shall be established 5 feet from the edge of the excavation, and a warning sign shall be posted in this area to alert personnel of the dangers.

- Areas within a quarry that are directly beneath the excavation areas shall be barricaded to prevent personnel from standing below in areas with a potential hazard of falling objects/debris.

- When lowering excavator(s) from the rim into a quarry, the load weight shall be checked to ensure lifting equipment has sufficient capacity.

- Air monitoring for carbon monoxide, oxygen, etc., shall be performed by EQ within vehicle cabs throughout work operations.

- Equipment operators shall wear appropriate PPE as outlined in the SWP to protect personnel from exposure to potential chemical and radiological hazards.

- Personnel shall be prohibited from reaching into loading operations with arms or legs while in operation.

- Any adjustments or repairs that need to be made to equipment (or loads) shall be made with the equipment disengaged and shut down. If there is a suspended load, the load shall be lowered to the ground (or securely braced) before any adjustments are made to the equipment.

3.0 CRANES

- All cranes must have proof of a thorough inspection within the last year by an appropriately qualified individual. Crane personnel platform (manbasket) and rigging equipment shall be inspected daily prior to use.

- Load capacities shall be stenciled onto the equipment and observed during operations. The combined weight of the loaded personnel platform/manbasket and its rigging must not exceed 50 percent of the rated load capacity in all locations where the platform will be positioned.

- All hooks, slings, and other fittings shall be the correct size for the work to be done and with sufficient capacity for the load to be lifted.

- The manbasket will be load tested at 150 percent of rated capacity prior to daily use and whenever it is reattached to the hoist line.

- The manbasket shall be equipped with the appropriate safety features to prevent personnel from falling out (guardrails, grabrails, overhead protection if necessary, etc.).

- The crane operator must always have full control over the movement of the personnel platform/manbasket. All vertical movement must use the power of the crane winch.

- Employees shall be prohibited from standing or working beneath crane booms.

- In the event of emergency repair work on hoisting equipment with a suspended load, the area below the load shall be barricaded and the load blocked or otherwise supported.

- Employees are prohibited from riding on loads, hooks, slings (etc.) suspended from hoisting equipment.

- All hooks, rings, pins, shackles, or other lifting attachments shall be inspected, and defective parts shall not be used. Wire ropes shall be free of kinks, sharp bends, or twists.

- When the occupied personnel platform/manbasket is in a stationary position, all brakes and locking devices on the crane must be set.

- All cranes used for personnel hoisting must have a boom angle indicator that is visible to the operator, and shall be equipped with either an anti-two-blocking device that prevents contact with the load block or a two-

block damage feature that deactivates the hoisting action before damage occurs.

- No mobile crane will operate or make a heavy lift without its outriggers fully extended to assure maximum stabilization of the equipment.
- Appropriate hand signals shall be predetermined and used during crane operations. Only one individual shall issue signals to the operator unless a relay system is necessary.
- Tag lines shall be used at all times for controlling swinging loads.
- The crane operator and rigger shall confirm that the load is properly secured and balanced before it is lifted.
- Crane operations shall be stopped or restricted during bad weather or poor visibility.

4.0 MAINTENANCE AND REPAIRS

- All equipment hazards identified shall be controlled.
- Operators shall not wear loose clothing that might get tangled in the equipment or controls.
- Appropriate machine/equipment guards shall be in place and intact at all times during operation. When guards require maintenance or replacement, equipment will be shut down and repaired, to be restarted only when guards are replaced and in good condition.
- Heavy equipment shall be demobilized to a staging area and decontaminated as necessary before performing maintenance or repairs.
- An equipment repair log shall be maintained and updated on a daily basis/whenever a repair or adjustment is made.
- Pinching and cutting hazards shall be controlled by prohibiting personnel from reaching into running equipment and by wearing the appropriate PPE. All equipment repairs shall be made while equipment is shut down.
- Appropriate PPE shall be used as outlined in the SWP to prevent contact with chemicals.

5.0 REFUELING

- The equipment engine must be shut down and locked/tagged out before any refueling operations are conducted.
- Appropriate ABC-type fire extinguishers shall be available.
- All ignition sources shall be eliminated.
- Fuel shall be brought to the equipment using the designated vehicle. Appropriate vehicle safety precautions shall be followed.
- Appropriate grounding/bonding shall be conducted before transferring fuel.

6.0 DECONTAMINATION AND REMOVAL

- Appropriate PPE shall be worn as outlined in the SWP (faceshields, etc.).
- Only trained, authorized personnel shall operate high-pressure washers.
- The lance/nozzle must always be pointed at the work area, and not toward other personnel.
- The operator shall maintain good footing during cleaning.
- Non-operators shall maintain a safe distance (25 feet) from the operator during washing.
- Washer operators shall alternate to avoid fatigue. Assistants shall also be used to help move and handle the equipment.
- Washer equipment shall be cleaned/rinsed periodically to avoid build-up (around trigger, guard).
- An assistant shall monitor the pressure during operations, and shall stand near the generator in case emergency shutdown is necessary.
- All lances/nozzles shall be constructed of seamless stainless steel to avoid rusting.
- Washers shall be operated at the designated pressure. Inspections shall be made for leaks and malfunctions; damaged or faulty equipment must be repaired or taken out of service immediately.

- Personnel shall use proper lifting techniques such as keeping their back straight, lifting with legs, limiting twisting, getting help in moving bulky/heavy loads, and using mechanical equipment to move material and equipment when appropriate.

- Personnel shall work at a rational pace.

- If decontamination is performed in the presence of electrical circuits, appropriate provisions shall be made to disconnect them or protect them from contact with water.

GENERAL INFORMATION

VACUUM TRUCK:

The term "Vacuum Truck" can mean one of two types and you should know the difference. Air Machines move material on a column of air and air is always needed in order to vacuum materials both wet and dry. These types of vacuum units use either large fans or positive displacement blowers to create the vacuum.

The other type of vacuum truck is known as a "Conventional Vacuum Truck" and this type must maintain a "head" of material (liquid) in order for the vacuum pump to work. These units normally use smaller diameter vacuum lines, in most cases no larger than four (4) inches although some have the capability of vacuuming with a six (6) inch line. When using this type of vacuum unit, if the liquid is not filling the hose or if the hose comes out of the material being vacuumed, the tank will lose its vacuum and the hose will not "suck".

Several factors are taken into consideration in vacuum conveying requirements; air velocity, material density, particle size, particle shape, friction, moisture content, conveying distances and number of suction lines used.

AIR VELOCITY:

The performance of a vacuum loading system is relative to the air velocity that is maintained. Only air velocity conveys material. Each material has a given minimum conveying velocity which must be maintained to avoid plugging the system. Whenever the air speed falls below the minimum conveying velocity, material drops out of the air stream and cannot be recaptured during the periods when air velocities are insufficient. This problem is compounded because more material is constantly being introduced, and insufficient air speed will result in a plugged line.

VACUUM LOADING:

Vacuum loading systems must include reference to physical measurements such as Vacuum (in. of water), Air Volume (CFM), and Air Velocity (ft./min.).
These are measures of air handling characteristics of an Air Machine "Baghouse type" system as well as Wet Vac "Tank Truck" type vacuum systems.
The term "Vacuum" is somewhat misleading because it is the air movement or air velocity that actually conveys the material into the debris tank or sludge tank. The "vacuum" is only the measurable difference between the low pressure (vacuum) created inside a tank by sucking air out it and the air pressure on the outside of the tank. Unless the outside air can rush into the tank, nothing happens and we have a static condition. This is the situation that is created with a home vacuum cleaner when a hand is placed over the end of a pick-up tube or when the nozzle is tightly pushed against the surface being vacuumed.

VACUUM LOADING:

Since no air is being moved, no work is being done. To do the work, a lot of air has to be moved through the intake hose and has to move fast.
A common pitfall in vacuum conveying systems is the attempt to convey materials at too high an air velocity. The greatest amount of a specific material is conveyed at air speeds just above its minimum conveying velocity. Higher air velocities create tremendous frictional losses as they are increased. Increase the rpm's to a point where the vacuum is picking up the material and conveying it effectively, and maintain it at that point unless it needs to be increased due to heavier material.

The three main components of any mobile vacuum system are:

1. The vacuum pump
2. Vacuum chamber or tank.
3. The air inlet or pick-up hose.

The vacuum pump is one of the most essential parts of the system. The pump exhausts air from the body, creating a vacuum or negative pressure in the tank. This air is replaced by outside air at a very high velocity going through an air inlet. The more air that the vacuum pump can move (measured in cubic feet per minute) CFM, the higher the velocity through a pick-up hose.

LOADING PERFORMANCE:

The loading rate and maximum suction line length are influenced by numerous factors, such as air velocity, material density, particle size, particle shape, friction, moisture, altitude, operator's skill, operator effort and many other factors. For this reason it is impractical to accurately state the performance of any vacuum loader. It is practical however, to approximate the performance for a typical, free flowing material if it is recognized that such approximations are meant to be relative indicators rather than absolute quantities. One of the greatest factors in the vacuum truck performance is in the operator. A trained operator knows his equipment and what it will do.

GENERAL INFORMATION - CONT.

SUCTION LINE SET UP FACTS:

In determining the best overall suction line set-up, the following facts should be considered.

A. Larger hose diameters provide greater vacuum conveying efficiency and greater loading rates.

B. Loading rates are reduced as conveying distance is increased.

C. Physical effort required relative to hose size;

1. A 4" diameter hose and smaller (2",3") can be handled by one man with minimal rest periods.

2. A 6" diameter hose can be handled by one man but requires frequent rest periods. Normally two men will alternate or use multiple smaller hoses at the work area.

3. An 8" diameter hose cannot be handled by the average man without great physical exertion. Normally a line this size is used with an "Air Machine" and is reduced to multiple hoses of smaller diameter.

D. Bends reduce loading rates significantly. Straight runs with a minimum number of long radius bends made with suction hose is the most efficient set-up. Use the largest diameter suction line designed for the unit, from the vacuum truck to the work area. Use pipe, when possible, for straight runs and hose for bends and material pick-up. When using a long header, block the line up so that you have the header on an incline toward the vacuum truck. The material will flow better and you will not experience as much material build-up in the line. A header line without an incline will have material bridging within the pipe on all dry materials and most sludge materials.

SAFETY:

One thing an experienced operator will stress, is safety. As you are being trained in the operation of a Vacuum Truck, you must also be trained in the safety aspects of the operation.

- Respect the equipment for what it is intended; it is a machine and functions as a machine.
- Keep the suction line away from your body and especially your face, use it for what it was intended.
- Do not attempt to make any adjustments on the unit while it is running or operating.
- Stop the engine and then adjust whatever is needed.
- Keep hands away from moving parts.
- While the unit is in operation, it is best to have someone else around that knows how to stop the unit in case of an unlikely accident.
- Always wear the required protective gear for personal protection while working with this type of equipment.
- Always be informed of the hazards associated with any product or waste you are loading or unloading while working with this type of equipment.

NEVER ALLOW AN UNTRAINED OPERATOR TO OPERATE THE EQUIPMENT

OPERATOR GUIDELINES:

The operator of the unit maintains the responsibility of equipment care while it is being used. This is an important job and one that will determine to a large degree, the extent of profit from a service operation. There are comparatively few rules which the operator must observe to get the best service from the vacuum equipment. It is best, if possible, to keep a minimal number of operators responsible for each vacuum unit or develop a written "log in" "log out" report if many different operators will be using the unit. This will allow the owner to better track any problems that may occur during a use cycle of the unit.

Prior to operating the unit, the operator should pre-check all components for proper fluid levels, cleanliness, leaks and proper operation. This manual includes helpful information detailing important areas to be checked.

During operation, the operator should monitor the vacuum unit closely. While the unit is running it is important that the operator has a sense or feel for what is happening at the loading hose. He should stay close to the unit at all times and listen as well as watch for any out of the ordinary occurrences. Anything that looks, feels or sounds abnormal should be addressed and corrected immediately. This type of action is safer and will lesson the possibility of major breakdowns.

At the conclusion of a working shift, the operator should ensure that proper cleaning of the unit has been accomplished, that any problems noted are corrected and that a post check of all components, as in the pre check, has been performed. Once the operator becomes familiar with these guidelines, it becomes very easy to follow. The operator will become eager to perform the vacuum functions needed and will take pride in having his unit running to peak performance all of the time.

GUIDELINES FOR HOSE SET-UP:

In general, it is always best to take the shortest straight line possible from the vacuum source to the loading area. When this distance encompasses more than 50' during "dry" product loading, it is most productive to run the set-up line with "hard pipe" as long as possible using gradual turns where possible. When the loading area is reached, then a lightweight, flexible line can be used as a "work whip".

"Hard Pipe" can consist of any hard structure piping capable of holding the amount of vacuum the vacuum source can produce. It can range from aluminum tubing, steel pipe, or in many cases plastic PVC pipe. When using plastic PVC piping, schedule 40 or greater should be used.

GUIDELINES FOR HOSE SET-UP:

A "work whip" is generally lightweight plastic irrigation type hose. It is very lightweight and easy for one person to handle. The abrasive characteristics of this hose type are poor. The "work whip" is best used in sections not longer than 10 feet. In a typical application of cleaning dry solid material, a 10' work whip would be good for about 1-2 hours of pumping. Once it has served its purpose it should be removed from the main set-up line and set aside for disposal and a new "work whip" should be installed.

Heavy duty rubber suction hose has its place also. This hose type should be used when doing any submerged hose pumping. The heavy duty rubber suction hose has very good characteristics for submerged pumping and is available in many lengths and diameters. In general most submerged pumping is done with 3", 4" or 6" diameter suction hose. Again it is important that the amount of vacuum produced by the source is used as a guideline for the hose that is selected. The heavy duty rubber suction hose is also used in many dry pumping situations as the first line off the source to connect to a "hard pipe" set-up.

Leaks in the set-up line can be aggravating and very non productive when loading products. It is very important that the operator secure all connections starting at the source and follow through to the loading site. Although this may take a little more time on initial set-up, it will save much more time by allowing optimum loading rates throughout the cleaning process.

HOSE HANDLING TIPS:

The positioning and maneuvering of the loading hose is a very important task. Proper handling will maximize the performance of the vacuum source. Two types of product loading are used.

1. Vacuum Loading - This type of loading is in effect when the loading hose is completely submerged in the product you are pumping. Liquid, sludges and semi-solids are generally pumped this way. When vacuum loading, it is best to use a 4" hose or smaller due to the fact that the entire hose will fill up with product making it very heavy. When vacuum loading, the flow rate of product to the vacuum source is controlled by the size of the suction hose. If you desire a faster loading rate, use a larger diameter loading hose.
2. Air Conveying - This type of loading occurs when the loading hose is held close to the material being loaded or is partially submerged. When air conveying product it is important to allow a continuous flow of air from the vacuum source to the end of the loading hose at all times. When air conveying is used, the product rides on this column of air into the vacuum tank.

HOSE HANDLING TIPS:

Larger hoses are better when loading by air conveying. Solid, dry and dusty products are generally loaded this way. When positioning the loading hose to pump dry or dusty products it is most efficient to keep the loading hose angled about 30° from the hard floor surface and work into the product from the ground level. This provides a continuous air flow through the hose during the entire loading process and will prevent the loading hose from getting blocked up with product.

When the loading area is out of reasonable sight of the operator and equipment, it is recommended that a "quick vent" source be provided close to the hose handler . One way to accomplish this is by coupling the loading hose to a "tee" connection. The stem of the "tee" should point up and a oversized cover should be used to block the opening. A tall shaft should be attached to the block with a rope or cable secured to it at the top. The rope or cable should then be secured to the hose handler. If a "quick vent" is needed, the hose handler simply pulls the rope or cable which uncovers the "tee" stem opening, allowing the vacuum to vent.

IMPORTANT

When using any type of "quick vent", test for proper operation before each loading process.

Loading Dusty Products and Powders

(KING VAC® & BERRINGER®)

A common pitfall when loading dusty materials, powders or other very light product, is the common habit to run the vacuum equipment at full RPM speed.

The ultimate goal of any vacuum loading or air conveying project is to keep as much of the loaded material as possible in the debris tank.

During the loading of light dusts, powders and other light fine materials, this goal can be best accomplished by reducing the air flow on the vacuum equipment. This can be done in many ways. Listed below are a few.

1. Use a larger diameter hose.
2. Lower the RPM speed of the vacuum source.
3. Create a vent source between the product loading point and the debris tank.

The **KING VAC®** and **BERRINGER®II** air flow can be reduced by:

1. Selecting a lower gear to run the main pump.
2. Lowering the RPM speed control.
3. Running with #4, #5 or both vent valves open.
4. Running with the left or right side cleanout open.
5. A combination of any of the above.

The **BERRINGER®** air flow can be reduced by:

1. Lowering the RPM speed control.
2. Running with the vent valve open.
3. A combination of any of the above.

The vacuum equipment operator must oversee the vacuum loading project attentively to determine the proper loading parameters of the vacuum source. This will result in optimum efficiency of the equipment and minimize cleanup time at the end of the project. It is very important to follow the instructions for "OPERATING AUTOMATIC CYCLONE CLEAN-OUT" located in the Operation Section of this manual.

ATTACHMENT J

HEAT AND COLD STRESS

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Stress, Cold/Heat**	**Document No.**	**66**
Date of Issue:	**November 1999**	**Revision No.**	**2** **Page 1 of 7**
Approval		**Approval**	

COLD STRESS

1.0 OBJECTIVE

Environmental Quality Management, Inc. (EQ) recognizes that work must be performed in various weather conditions, including cold climates. In order to minimize cold-related illnesses, site supervisors are to be aware of the symptoms of environmental conditions that lead to cold-related illnesses and the appropriate steps to take to prevent their occurrence.

2.0 PURPOSE

This procedure describes the causes, symptoms, treatment, and/or prevention of cold-related illness.

3.0 GENERAL INFORMATION

When the temperature of the surrounding air or water is much colder than the worker, the body's physical processes must increase to maintain thermal balance. Shivering is the body's attempt to generate increased heat.

Shivering, pain, and numbness are not trustworthy indicators of cold exposure because prolonged cold exposure numbs all body sensations. Rather, wind-chill temperature is a better means of evaluation because it takes into account the wind's ability to strip heat from the body through convection.

Protective clothing that is wet with sweat or from rain will cause heat loss through conduction.

Personnel are at an extreme cold stress hazard when performing spill clean-up in boats in cold weather situations. Falling into cold water can rob the body of dry heat very quickly.

4.0 COLD INJURY

Trench Foot occurs as a result of extended exposure of the feet to cold and moisture. Capillary walls of the feet are injured, resulting in tingling, itching, and pain. Blisters may form, followed by ulceration of the skin.

Frost-Nip is localized superficial freezing of extremities such as ears, nose, toes, and fingers. Initially there is a dark bluish color due to bleeding under the skin which at times can become gangrenous. Workers experiencing frost nip are susceptible to future injury and should avoid chilling.

Frostbite occurs when the moisture in the skin actually freezes, forming ice crystals, resulting in the damage of skin cells. The injured area becomes red, then blue/red. A burning pain is noted initially, then pain decreases and numbness sets in. The skin becomes waxy pale in appearance because of a lack of oxygen. The ears, nose, toes, and fingers are most susceptible. Damaged areas can become gangrenous resulting in the loss of tissue, finger tips, and toes.

Hypothermia occurs when heat production of the body is not sufficient to replace heat lost to the environment. The results are a lowering of the core body temperature, the pulse rate slows, muscular weakness occurs, mental abilities dull, and the workers become uncoordinated. Signs of hypothermia are evident at 95 degrees Fahrenheit body core temperature, and consciousness is lost between 89.6 - 86.0 degrees Fahrenheit. At lower core temperatures, cardiac arrest is possible.

Exposure to cold water decreases the body core temperature rapidly and consciousness is quickly lost. Workers on or over water should be acutely aware of the danger of immersion during cold weather.

Hypothermia results in dulling of the senses and could result in poor decision making. Workers that are exposed to extreme cold should not be given tasks that are critical to their health and safety or that of others.

5.0 PREVENTION

Just as with heat stress, cold stress must be controlled in order to prevent cold-related illness. The following are cold stress prevention guidelines.

Education - All personnel will receive training on the cause, symptoms, and (most importantly) methods of prevention of cold stress injuries.

Clothing - Prevention of hypothermia and other cold injuries is best accomplished by protecting workers from cold and moisture. Clothing is the most important factor in prevention of injury. Personnel working on land should layer clothing with the outer layer being wind and water resistant. The layers should be capable of being vented at the wrist, neck, and waist to reduce wetting by perspiration. Feet should be kept dry and socks should be changed when they become wet. Gloves which protect the hands from cold but allow freedom of movement are necessary. Never allow bare skin to contact metal surfaces at sub-zero temperatures.

Acclimatization - A limited degree of acclimation can occur from exposure and working in cold environments. Some physiological changes do occur, but people also learn how to more effectively protect themselves from temperature extremes.

Fluid Replacement - Cold weather does cause significant water loss as a result of the dryness of the air. Fluid intake should be increased to prevent dehydration which directly affects blood volumes and flow to the extremities. Warm, sweet, caffeine-free, nonalcoholic drinks and soup offer the best fluid replacement and provide caloric energy.

Work-Rest Regimes - When temperatures are less than 20° F (actual or windchill), heated warming shelters should be made available. Workers should use these on a regular basis.

Diet - As with any work in extreme temperatures, personnel will be instructed to eat a well-balanced diet to replace calories burned and provide necessary vitamins and nutrients.

Environmental Monitoring - Regular monitoring of the environment by recording wind speed and actual thermometer readings for comparison to the windchill chart should occur at regular intervals depending on conditions.

Prohibited Activities - Alcohol should not be consumed because it increases blood circulation to the skin and interferes with internal thermostatic control. Alcohol also interferes with mental acuity, which can lead to risk taking. Cigarette smoking should be prohibited since the nicotine restricts the flow of blood to the extremities.

HEAT STRESS

1.0 OBJECTIVE

In work situations where heat stress may be a factor, Environmental Quality Management, Inc. (EQ) will attempt to prevent heat-related illness by use of work-rest schedules, physiological monitoring, and/or personal cooling devices.

2.0 PURPOSE

This procedure describes the causes, symptoms, treatment, and prevention of heat-related illness.

3.0 GENERAL INFORMATION

Heat-related illnesses are caused by the body's inability to dissipate excessive metabolic heat while wearing PPE.

A period of adjustment or acclimatization is necessary before maximum tolerance to heat is acquired. Most workers require 7 to 10 working days of gradually increasing workload to become fully acclimatized.

4.0 HEAT-RELATED ILLNESSES

Heat rash can be caused by continuous exposure to hot and humid air and skin abrasion from sweat-soaked clothing.

Signs and Symptoms: The condition is characterized by a localized red skin rash and reduced sweating. Aside from being a nuisance, the ability to tolerate heat is reduced.

Treatment: Keep skin hygienically clean and allow it to dry thoroughly after using chemical protective clothing.

Heat cramps are caused by profuse perspiration with inadequate fluid intake and salt replacement. This often robs the larger muscle groups (stomach and quadriceps) of blood which can make them cramp.

Signs and Symptoms: Muscle spasm and pain in the extremities and abdomen.

Treatment: Remove affected person to a cool place and give sips of clear water or an electrolytic drink (Gatorade®). The person experiencing heat cramps should lightly salt his/her food to make up for the sodium lost when sweating. Manual pressure may also be applied to the cramped muscles.

Heat exhaustion is a mild form of shock caused by sustained physical activity in the heat and profuse perspiration without adequate fluid and salt replacement.

Signs and Symptoms: Weak pulse; shallow breathing; pale, cool, moist (clammy) skin; profuse sweating; dizziness; fatigue.

Treatment: Remove affected person to a cool place and remove as much clothing as possible. Give sips of water or electrolytic solution and fan the person continually to remove heat by convection. CAUTION: Do not allow the affected person to become chilled -- treat for shock if necessary.

Heat stroke is the most severe form of heat stress; the body must be cooled immediately to prevent severe injury and/or death. **THIS IS A MEDICAL EMERGENCY!!**

Signs and Symptoms: Red, hot, dry skin; body temperature of 105 degrees Fahrenheit or higher; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma.

Treatment: Heat stroke is a true medical emergency. Transportation of the victim to a medical facility must not be delayed. Prior to transport, remove as much clothing as possible and wrap the victim in a sheet soaked with water. Fan vigorously while transporting to help reduce body temperature. Apply cold packs, if available; place under the arms, around the neck, or any other place where they can cool large surface blood vessels. If transportation to a medical facility is delayed, reduce body temperature by immersing victim in an ice/water bath (however, be careful not to over-chill the victim once body temperature is reduced below 102 degrees Fahrenheit). If this is not possible, keep victim wrapped in a sheet and continuously douse with water while fanning the victim.

5.0 SPECIFIC REQUIREMENTS

The environmental hazards section of site health and safety plans will address heat stress if the ambient temperature is expected to exceed 65 degrees Fahrenheit.

The site health and safety plan will discuss work-rest cycles and provisions for monitoring the level of heat stress (i.e., pulse rate).

Workers are to be advised not to drink caffeinated or alcoholic beverages because they increase the rate of body water loss.

Increased dietary salt or lightly salted (0.2 percent) water is adequate to replace lost salt. Salt tablets are not to be used.

If juice or electrolyte drinks are used, they should be diluted prior to drinking.

Thirst is not an adequate indicator of body water loss. Workers are to drink at least small amounts of water on each break.

Workers are to rest when any of the symptoms described above are present. The buddy system is mandatory, as most often the potential victim will not be aware of any symptoms. Watch out for each other.

EQ HEAT STRESS PHYSIOLOGICAL MONITORING LOG

Site: _____ Date: _____ Safety Representative: _____

Ambient Conditions: _____ Start work area temp: _____ Stop work area temp: _____

NAME	REPRESENTING	AGE	MEDICAL NOTES	TIME IN	ORAL TEMP	HEART RATE	BODY WGT.	TIME OUT	ORAL TEMP	HEART RATE	BODY WGT.

Notation/Comments: _____

ATTACHMENT K

WASTE SAMPLING (SLUDGE, LIQUID, PILE)

WASTE SAMPLING

1.0 GENERAL

Waste sampling as discussed in this section includes the collection of sludge samples from municipal and industrial wastewater treatment facilities; samples of liquid waste and sludge from pits, ponds and lagoons; the collection of concentrated waste samples from open and closed containers such as drums, barrels, tank trucks, and storage tanks; and waste piles.

Generally the collection of sludge samples from municipal and industrial wastewater treatment plants is a low risk operation. However, the collection of liquid waste and sludge samples from open containers and liquid waste from pits, ponds, or lagoons and solid waste from waste piles may involve sampling operations that are inherently dangerous to the personnel involved. Sampling of closed containers (barrels, drums, etc.) shall be considered a high hazard operation by all personnel. Additional safety guidance is included in the draft EPA Safety Manual for Hazardous Waste Site Investigations.

1.1 Collection of Municipal Wastewater, Industrial Wastewater, and Municipal Water Treatment Plant Sludge Samples

1.1.1 Sampling Locations

Sampling locations must be carefully selected to insure that the samples are truly representative of the material being sampled. The following are suggested locations for different sampling conditions.

1.1.1.1 Municipal Sludge Being Drawn to a Drying Bed

Collect samples from the pipe flowing to the bed or at the discharge point into the bed. Take three or more aliquots of samples during the draw period to insure that variations in the sludge concentrations and consistency are accounted for.

1.1.1.2 Sludge from an Anaerobic Digester

It is difficult to insure that the contents in these units are well mixed. Samples can be taken from sample ports in the recirculation lines if so equipped. Otherwise, samples can be taken from "thief holes" in the floating top of the digester.

1.1.1.3 Sludge from an Aerobic Digester

It is much easier to sample these units because of the clear view of the contents. Samples should be taken while the contents are being mixed and from the 1/3 - 2/3-depth zone.

1.1.1.4 Sludge from a Quiescent Holding Basis (Water or Wastewater)

One sample cannot be collected which will be representative of the total contents of the basin since the material is generally stratified. Samples can be collected from the upper relatively clear liquid layer as one would collect any water sample. Sludge samples should be collected from the basis from a boat or a platform. Sediment sampling devices are required to collect these samples.

1.1.1.5 Sludge from Drying Beds

After sludge is partially dried and cracked, samples can be collected with a stainless steel spoon, shovel or similar device. Samples should be collected from three or four locations in the bed to insure a representative sample. The sample should be collected of the full depth of sludge on the bed.

1.1.2 Equipment

Equipment required for the collection of sludge samples includes: sample containers; stainless steel spoons and shovels; stainless steel ponar dredges; stainless steel scoops attached to a conduit pipe; stainless steel push tubes; and Peterson and Eckman dredge.

1.1.3 Sampling Technique

If the sampling techniques involves multiple aliquots or if the final sample will consist of aliquots from several locations, all aliquots should be placed into a Pyrex® dish, or other suitable container, and mixed thoroughly before containerization.

If the sludge layer is shallow or if only the surface is to be sampled, samples can be collected directly into the sample container.

If depth samples are required, the methods described in Section 1.2.4.2 Sampling Techniques - may be used.

Regardless of the method used, special care must be taken when collecting the sludge sample to ensure that excess water flowing out of the sampling device does not wash out much of the fine material, thus biasing the sample.

1.2 Pits, Ponds, and Lagoons

1.2.1 General

For the purposes of this subsection, pits, ponds, and lagoons refer to any basin, pit or open tank, lined or unlined, which contain or are suspected of containing unknown concentrated liquid chemical waste. This discussion does not include municipal and industrial wastewater treatment ponds or natural or man made surface water impoundments.

1.2.2 Sampling Locations

Sampling locations within pits, ponds, and lagoons should yield samples which are representative of that section, or of the entire pit, pond, or lagoon is being sampled. All phases in the pit, pond, or lagoon (floating solids, all liquid phases, and sludge) should be sampled. The only exception to this policy will be situations where representative samples cannot be safely collected or where the

investigative team is attempting to determine worst case conditions.

Because of the inherent dangers with sampling known or unknown concentrated waste, sampling personnel should never attempt to sample pits, ponds, and lagoons by using a boat. All sampling should be accomplished from the banks of pits, ponds, and lagoons or from piers. Any deviation from this policy must be cleared with the PM and HSO.

1.2.3 Liquid Waste Sampling

1.2.3.1 Equipment

The following equipment may be needed for field use in collecting liquid waste samples from pits, ponds, and lagoons: sampling containers; sampling container affixed to a piece of conduit pipe; stainless steel scoop affixed to a piece of conduit pipe with tape or scoop bracket; stainless steel spoon attached to a conduit pipe; peristaltic pump and vacuum jug arrangement; Bacon-Bomb samplers; and profile tubes for phase determination and possible sampling.

1.2.3.2 Sampling Techniques

If the sampling technique utilized requires multiple aliquots, or if the final sample will consist of aliquots from several different locations in the pit, pond, or lagoon, all aliquots should be placed into a Pyrex® dish or large glass sample container, or other suitable compositing container, and mixed thoroughly before containerization.

Floating solids can be sampled directly or with a stainless steel scoop or spoon attached to a piece of conduit pipe.

The presence of individual liquid phases can be determined by using a profile tube. The top liquid phase can be sampled by directly dipping with the sample container; dipping with the sample container attached to a conduit pipe, either directly or by way of a fishing pole type arrangement, or dipping the sample with a stainless steel scoop attached directly to conduit pipe. Other liquid phases can be sampled with a peristaltic

pump/vacuum jug arrangement with the end of the Teflon® tube intake attached to a conduit pipe and held at the desired depth or with Bacon-Bomb sampler opened at the desired depth. The Bacon-Bomb sampler can be operated directly from the banks of pits, ponds, and lagoons or from piers or operated by way of a fishing pole type arrangement using a piece of conduit pipe.

1.2.4 Sludge Sampling

1.2.4.1 Equipment

The following equipment is required for field use in collecting sludge samples from pits, ponds, and lagoons: stainless steel ponar dredges; stainless steel scoop attached to a conduit pipe; and stainless steel push tubes.

1.2.4.2 Sampling Techniques

If the sampling technique involved multiple aliquots, or if the final sample will consist of aliquots from several different locations in the pit, pond, or lagoon, all aliquots should be placed into a Pyrex® dish or other suitable container and mixed thoroughly before containerization.

Sludge samples can be collected by pushing a stainless steel push tube into the sludge and emptying the tube contents into a Pyrex® dish or other suitable container. "Empty" can include shaking to remove sludge or extrusion of thick or gummy sludge with a new wooden dowel. A disadvantage of this technique is the need for multiple insertions of the tube into the sludge to collect sufficient sample volume.

Sludge samples can also be collected with a stainless steel ponar dredge. An advantage of this technique is that one operation of the dredge usually yields sufficient sample volume for most sampling efforts.

One of the easiest methods of collecting a sludge sample consists of attaching a stainless steel scoop to a piece of conduit pipe with either strapping tape or a scoop bracket, and dipping the scoop into the sludge. An advantage of strapping tape is that it generates less

equipment to decontaminate. However, glue on the tape may dissolve rapidly in oily or solvent type wastes. The scoop bracket has a decided advantage in that it allows sampling personnel to adjust the angle between the scoop and the conduit pipe.

1.2.5 Open and Closed Container Sampling

1.2.5.1 General

Sampling of closed containers (drums, barrels, tanks) should only be conducted when absolutely necessary. Whenever container sampling is necessary, the first priority should be the collection of samples from open containers since open containers generally present less hazard to the samplers than closed containers (i.e., volatile compounds have already evaporated, extreme acute toxicity would probably be evident from dead animal life or vegetation around the site). Closed containers must be considered as extremely hazardous from either the toxicity, explosion, or fire standpoints. Chronic toxicity may be a danger in both open or closed containers. Because of the dangers involved with container sampling, the sampling of drums, barrels, or other containers containing either unknown material or known hazardous material shall be considered a hazardous duty assignment. Additional information regarding container sampling is available in the draft EPA Safety Manual for Hazardous Waste Site Inspections.

A problem which often arises in container sampling is stratification and/or phase separation of the container contents. When this condition occurs or is suspected, care must be taken to insure that the sample collected is representative of the container contents. If only one layer or phase is sampled, this should be noted and taken into account when interpreting analytical results. For example, if a large tank is being sampled for PCB's and the only valve or access port available for sampling is at the bottom of the tank, it should be noted that the concentrations of PCB's might be biased toward high concentrations, since PCB's are heavy and tend to collect near the bottom of a container.

Where possible, samples should be composited with depth (i.e., collected throughout the entire depth of the container or at several different depths) to provide a representative sample. When a drum or cylindrical container is standing vertically, depth compositing provides a good quantitative estimate of the container content. In other cases where such containers are tipped, horizontal, deformed, etc., depth compositing will provide a representative sample at least on a qualitative basis. (Note: A quantitatively representative sample could be collected, but would require sophisticated sampling methodology involving multilayer sampling and volume measurements; this is not recommended unless initial screening indicates it is absolutely necessary.)

1.2.5.2 Equipment

The following equipment is required for collecting waste samples from open and closed containers: a complete set of spark-proof tools including barrel bung wrenches, adjustable wrenches, etc.; a remote barrel opening device; glass tubes for barrel sampling; glass profile tubes for container sampling; Bacon-bomb samplers for container sampling; and peristaltic pumps and vacuum bottles arrangements for liquid waste sampling from containers.

1.2.5.3 Sampling Techniques

Closed drums, barrels, or other containers (including storage tanks) containing unknown materials or known hazardous materials shall be opened only using spark proof opening devices. A remotely controlled device may be used when deemed necessary. Such a device involves the use of a remotely operated pneumatic wrench along with a brass pressure fitting bung socket.

Samples from drums or barrels can be collected using a four-foot length of glass tube. In most instances, glass tubes with a one-half inch or less inside diameter work best. The tube is inserted into the opening of the drum or barrel as far as possible. The open end is then sealed either with the thumb or a rubber stopper to hold the sample in the tube while removing the tube from the container. The sample is then placed in the appropriate

container and the procedure is repeated until an adequate amount of sample is collected. Sample volume shall be held to the absolute minimum required for analysis. An optional method involves the use of a piercer valve which is inserted into the drum or barrel using a remotely operated hydraulic jack; however, this method should be used only as a last resort. Several valves may be required at different depths on the drum or barrel if stratification has occurred. The sample is collected directly from the valve.

Other sampling procedures that include the use of automatic samplers, pumps, siphons, multiple valves and ports, etc. may be used depending on the specific container involved. These procedures should not be used unless it can be established that their use will not constitute a fire or explosion hazard. This determination shall be made only after field reconnaissance, collection of appropriate field data (explosion meter, photoionizer, etc.) and consideration of available file information on the site.

Tank trucks and storage tanks containing liquid wastes are a special case. Samples may be collected from access ports on top of these tanks or trucks using the techniques outlined above. Tank trucks are often compartmentalized and the investigator should insure that all compartments of the tank truck are sampled. Sampling from discharge valves usually found on tank trucks is not recommended due to potential stratification of tank contents. However, if the investigator has to sample from a tank truck discharge valve, the valving arrangement of the particular tank truck being sampled must be clearly understood to insure that the contents of all compartments are sampled. The same precautions apply to sampling from storage tank valves. In either case, the investigator must realize that samples obtained from valves (particularly those at or near the bottom of the tank truck and storage tanks) may not yield representative samples.

1.2.6 Waste Piles

1.2.6.1 General

Waste piles may consist of sludges and other solid waste, liquid waste mixed with soil, or any type of waste mixed with construction debris, household garbage, etc. Each situation presents an unique challenge to the sampler in the selection of an appropriate sampling location and technique.

1.2.6.2 Sampling Locations

Sampling locations should be selected which will yield a sample which is representative of the waste pile being investigated. The only exception to this policy will be situations in which representative samples cannot be collected safely or where the investigative team is attempting to determine worst case conditions. A representative sample from a small waste pile can often be obtained by collecting a single sample. The collection of a representative sample(s) from large waste piles, however, presents problems with both the number and locations of samples. For a sample(s) both the number of samples and the location where they are to be collected. A discussion of statistical methods which can be utilized is given in the Test Methods for Evaluating Solid Waste (SW-846) issued by the EPA Office of Solid Waste and Emergency Response.

1.2.6.3 Equipment

The following equipment is required for field use in collecting samples from waste piles: stainless steel hand augers; stainless steel push tubes; stainless steel shovels, stainless steel scoops; and stainless steel spoons.

1.2.6.4 Sampling Techniques

All samples collected should be placed into a Pyrex® dish and mixed thoroughly before containerization. Stainless steel shovels, spoons, or scoops should be used to clear away surface material before samples are collected. Near surface samples can then be collected with a clean

stainless steel spoon. Depth samples can be collected from the cleared location by forcing a stainless steel push tube into the pile or by augering to the desired depth with a stainless steel hand auger. When the desired depth is reached with a hand auger, a clean auger head should be used for collecting the sample. An alternate method for collecting depth samples is to dig to the desired depth with a stainless steel shovel or scoop and collecting the sample with a stainless steel spoon.

1.2.7 Specific Quality Control Procedures for Sampling Equipment

All major sampling and safety equipment used during investigations at hazardous waste sites including barrel openers, safety equipment (other than disposable gear), Geiger counters, explosion meters, cameras, etc. shall be identified so that this equipment can be traced through field records. A logbook shall be established for this equipment, so that all cleaning, maintenance, and repair procedures can be traced to the person performing such procedures and to specific repairs made. Quality control procedures for certain pieces of equipment, such as automatic samplers, pumps, soil sampling equipment, etc. are contained elsewhere in this manual.

All equipment used to collect waste samples shall be cleaned and repaired, if necessary, before being stored at the conclusion of a field study. In some instances, special decontamination procedures in excess of cleaning procedures will be necessary. These procedures will be developed on a case-by-case basis according to the specific material encountered. Provisions should also be made for disposal (preferably burial at the sampling site) of contaminated disposable equipment.

All equipment shall be tested before being issued for field studies.

Any cleaning procedures conducted in the field or field repairs, shall be thoroughly documented in the field logbooks.

1.2.8 Collection of Auxiliary Information and Data

The collection of auxiliary information and data is particularly important when collecting waste samples. Any field analyses, including those conducted with safety equipment such as photoionizers, explosion meters or approximate analyses such as those obtained with pH indicator paper shall be recorded in field

logbooks. Sketches of sampling locations, valving arrangements of tank trucks and storage tanks, markings on barrels, drums tanks, etc. should be thoroughly documented and in the logbooks. Photographs are particularly useful for recording this information and they should be used extensively during waste sampling operations.

ATTACHMENT L

COMPATIBILITY TESTING AND COMPOSITING

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Compatability Testing**	**Document No.**	**6**
Date of Issue:	**November 1999**	**Revision No.**	**1** **Page 1 of 56**
Approval		**Approval**	

1.0 OVERVIEW

This document describes the procedure for performing hazard categorization (Hazcat) testing and processing of that information into a usable form. This SOP is applicable for any tasks requiring the identification of the contents of unknown containers (drums, tanks, etc.). It provides information on the proper equipment and techniques for completing the subject procedure. This information can be used in the planning and execution of hazard categorization testing. Reference documents, general information, definitions, responsibilities, standard procedure, equipment, and supporting data are all provided to accomplish this task.

2.0 RELATED DOCUMENTS

For further information on Hazcat testing, and the methods used, refer to:

- *Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities,* National Institute for Occupational Safety and Health, Occupational Safety and Health Administration, U.S. Coast Guard, and U.S. Environmental Protection Agency
- *Standard Methods for the Examination of Water and Wastewater,* American Public Health Association
- *1996 Annual Book of ASTM Method, Section 5, Volume 05.02,* American Society for Testing and Materials
- *Test Methods for Evaluating Solid Waste: Physical/Chemical Methods,* Office of Solid Waste and Emergency Response

3.0 GENERAL INFORMATION

3.1 Hazcat Testing General Requirements

Hazcat testing will be performed in a hood with a face velocity of 100 ft/min. If a hood is not available (as in the case of in-the-field Hazcat testing), testing should be conducted while wearing Level C personal protective equipment. For safety reasons, no more than 50 Hazcat samples are to be in the laboratory at one time.

3.2 Laboratory General Requirements

Safety glasses must be worn at all times. Latex or nitrile gloves must be worn while handling chemicals or performing tests. Gloves should be changed frequently.

All reagent containers must be properly labeled. Material safety data sheets for all reagents used during testing must be readily available.

Safety equipment (fire extinguisher, eye wash, etc.) must be easily accessible and clearly marked.

3.3 Field General Requirements

A minimum of level C respiratory protection must be worn when performing Hazcat testing in the field.

A pair of outer gloves (latex or nitrile) must be worn while handling chemicals or performing tests. This is in addition to the inner and outer gloves worn as required by the level of protection in use as specified in the Site Specific Health and Safety Plan (SSHSP).

All reagent containers must be properly labeled. Material safety data sheets for all reagents used during testing must be readily available.

Safety equipment (fire extinguisher, eye wash, etc.) must be easily accessible and clearly marked.

4.0 DEFINITIONS

Bielstein test - a qualitative test used for testing samples for the presence of halogens (chlorine, bromine, fluorine, etc.).

Flame Ionization Detector (FID) - an instrument utilized to detect volatile organic compounds.

Hazard categorization testing - a series of tests performed on a sample to indicate a tentative hazard class for that sample. This allows samples with similar chemical composition to be grouped together, by hazard class and characterization, into bulk groups.

Level C personal protective equipment - air purifying respirator, gloves (properly duct taped), latex or PVC boots (properly duct taped), hooded coveralls (Tyvek, Polytyvek, or Saranex), and a hard hat.

Oxidizers - any compound that spontaneously evolves oxygen at either room temperature or under slight heating.

Peroxide - compounds that contain a bivalent oxygen-oxygen group (such as hydrogen peroxide, H_2O_2). Because they release oxygen readily, peroxides are strong oxidizers.

Photoionization Detector (PID) - an instrument utilized to detect organic and inorganic volatile compounds.

5.0 RESPONSIBILITIES

The Site Manager (On-Scene Coordinator) is responsible for the overall safety of site personnel.

The Site Quality Control Supervisor is responsible for the following:

- Oversight of the field analysts to ensure that Hazcat testing is performed correctly.
- Coordinating the Hazcat data generated for the samples.
- Reviewing the Hazcat data for discrepancies.
- Generating daily reports for the Site Manager.
- Interfacing with and providing support to the personnel arranging transportation and disposal of the contents of the containers.

Site Chemists are responsible for the following:

- Performing the Hazcat analyses as specified in the Sampling and Analysis Plan (SAP).

- Bringing any problems and discrepancies to the attention of the Site Quality Control Supervisor.

- Maintaining an inventory of supplies and notifying the team leader when additional supplies need to be ordered.

In many instances, the Site Quality Control Supervisor is also the Site Chemist.

6.0 PROCEDURE

6.1 Sample Documentation

Each sample undergoing hazard categorization (Hazcat) testing must be accompanied by a drum/container sampling log (Attachment A). The Hazcat data sheet is on the reverse side of the EQ drum/container log. For the purposes of Hazcat testing, each layer of a multilayered sample will be considered an individual sample. The sampling log must include all sampling information pertaining to the collection of the sample and information about the drum/container. The sampling log must also contain a description (color, clarity, and physical state) of the sample. The sample should be examined to ensure that the description of the sample on the sampling log matches that of the sample in the corresponding sample container. If at any time during Hazcat testing any result differs from information on the sampling log, the sampling information must be confirmed in the field.

Record the color of the sample at the time of Hazcat testing. The color of the sample should match what is recorded on the sampling log. If it does not, the contents of the drums must be double-checked. The colors, and their abbreviations, which may be used are listed. Only these colors are to be utilized. If the sample is multi-colored, use the most predominant color.

Amber (AMB)	Gray (GRY)	Purple (PUR)
Black (BLK)	Green (GRN)	Red (RED)
Blue (BLU)	Green-Blue (GRB)	Tan (TAN)
Brown (BRN)	Orange (ORG)	White (WHT)
Colorless (CLS)	Pink (PNK)	Yellow (YLW)
Cream (CRM)		

Record the clarity of the sample at the time of Hazcat testing. The three choices for clarity are clear (CLR), cloudy (CDY), or opaque (OPQ). Clarity is determined by holding the sample up to the light and observing the transmittance of light through the sample. Clarity is determined after first mixing the contents of the sample and then allowing it to stand for one minute.

Record the physical state of the sample at the time of Hazcat testing. The four choices for physical state are liquid (LQD), solid (SOL), sludge (SLG), and gel (GEL). Sludges should be identified as pumpable or non-pumpable. If the physical state of the sample differs from that logged in the field, the contents of the drum must be double-checked.

6.2 Air Monitoring

Immediately after opening the sample container, the sample should be screened with either a photoionization detector (PID) or a flame ionization detector (FID). This will help identify the presence of volatile compounds in the sample.

Each of the aforementioned instruments has limitations and it is necessary to keep these in mind when screening the samples. For instance, a PID may not detect volatile organic compounds if the ionization potential of those compounds is greater than that of the bulb in use with the PID.

6.3 Solubility Testing

6.3.1 Hexane

Place approximately 1 milliliter (ml) of sample and approximately 2 ml of hexane in a culture tube. Gently shake or swirl the culture tube to mix the contents (use a Vortex Genie, if available). Allow the contents of the tube to settle for one minute. If only one phase results, then the sample is soluble and is classified as organic. If the result is two layers, but the hexane takes on the color of the sample, then the sample is partially soluble and is classified as organic. If the sample is not completely soluble in hexane, the sample is not necessarily inorganic. For instance, methanol and ethanol are slightly soluble in hexane but both are organic. Record the result as soluble (S), insoluble (I), or partially soluble (PS). Record any other observations that are deemed relevant. Retain the culture tube, sample, and hexane for further testing.

6.3.2 Water

Place approximately 1 ml of sample and 2 ml of water in a culture tube. Note the ratio of sample volume to water volume at this time. Gently shake or swirl the culture tube to mix the contents (use a Vortex Genie, if available). While performing this test, check for water reactivity (see Section 6.5.2). If only one layer results, the sample is soluble. If the ratio of sample to water changes, then the sample is partially soluble. If there are two distinct layers, then the sample is insoluble. Record the result as soluble (S), insoluble (I), or partially soluble (PS).

6.3.3 Alternative Solvents

Alternative solvents, such as dichloromethane (DCM) and ethyl acetate, may be used in place of hexane. The procedure is the same at that described in Section 6.3.1. Organic compounds are more soluble in these solvents than in hexane. The drawbacks to these two compounds are that DCM is a suspected carcinogen and difficult to dispose of and ethyl acetate is highly flammable and the vapor is heavier than air (which means the compound is highly susceptible to flashback).

6.3.4 Main Interferences

The main interferences encountered when performing testing are the physical properties of the samples themselves. Some samples coat the side of the culture to making it appear that only one layer is present upon conclusion of the test (this is remedied by tilting the culture tube and observing the results). Some samples appear to be soluble only to settle out upon standing. This can be remedied by performing the remaining tests and then checking the contents of the culture tube a second time before disposing of the contents. Also, if not enough sample or solvent is placed in the tube, the interface may blend in with the curved bottom of the culture tube. The sample is then mistakenly identified as soluble. This problem may be alleviated by ensuring that enough sample and solvent are used and by performing the test in small diameter culture tubes (16mm x 125mm or 16mm x 150mm).

6.4 Density Test

Density is observed if the sample is insoluble or partially soluble in water. Upon completion of the water solubility test, examine the contents of the tube. If the sample is the top layer, the sample is lighter (L) than water. If the sample is the bottom layer, the sample is heavier (H) than water. Record the results with the water solubility results (e.g., if a sample is lighter than water, then the result is recorded as IL - insoluble, lighter).

Solubility and density results are difficult to determine with clear, colorless liquid samples. Two ways to alleviate these problems are to ensure that you use twice as much volume of water as sample and to observe the interface between the two layers. Usually, if the interface is convex (curved upward), the bottom layer is the sample. If the interface is concave (curved downward), the upper layer is the sample.

A sample that adheres to the sides of the tube may also cause problems when determining density. This problem can be alleviated by shaking the tube or using a tongue depressor to break off a small part of the sample into the solvent.

6.5 Sample Reactivity

6.5.1 Air Reactivity

There are two instances during which air reactivity may be observed: during sampling in the field or after opening the sample prior to Hazcat testing. In most cases air reactivity is the result of a reaction with moisture in the air, or the sample may be light sensitive. In some cases, exposure to air causes the loss of inhibiting compounds, resulting in polymerization of the sample. A sample is considered air reactive if it smokes, polymerizes, or changes physical state, color, or clarity upon exposure to air. Record the result as either a positive (+) or a negative (-). It is difficult to determine if a sample is air reactive. If you have any doubts, hold a wetted pH strip above the surface of the sample. If the pH changes, the sample should be considered air reactive.

6.5.2 Water Reactivity

Water reactivity is noted during water solubility testing. Water solubility testing must be performed in a hood because some materials, such as sodium and phosphorus tribromide, react violently with water. Other compounds, such as acids and bases, exhibit a small exothermic reaction. Some samples may exhibit an

endothermic reaction. To detect these reactions, hold the culture tube with the sample in your hand while waiting for the contents of the tube to settle (Section 6.3.2). Still other samples may polymerize upon the addition of water. Record the result as either a positive (+) or a negative (-). Most samples that are exothermically water reactive have a high or low pH following completion of the reaction. If you have any doubts as to whether or not a sample is water reactive, keep this in mind.

6.6 pH Test

The pH of the sample should be tested during water solubility testing. Testing for pH is accomplished by immersing a pH strip into the water (regardless of whether or not the sample is soluble). The pH strip is then compared against a color chart to determine the value. The value should then be recorded on the Hazcat data sheet. The pH of a sample should never be recorded as zero (it should be identified as <1).

The most effective pH strips use a four-zone system for identifying pH. The dyes in these zone are deactivated in the presence of most organic compounds. Therefore, it is more accurate to test the water phase during water solubility testing because the water often takes on the pH of the sample it comes in contact with. Another interference for pH testing is the physical characteristics of the sample. Dark colors make it difficult to accurately read the strip. To alleviate this problem, care should be taken when immersing the strip in the culture tube.

6.7 Peroxide Test

Using the culture tube with the results of the solubility tests, immerse a peroxide strip into the culture tube containing the solvent in which the sample was most soluble. If the sample was not soluble in any of the solvents used, immerse the strip into the hexane solubility culture tube. A blue color in the reaction zone indicates the presence of a peroxide. Record the result as a positive (+), a negative (-), or a concentration if the strip provides that capability.

A quality control (QC) check of the strips is performed by immersing the strip in hydrogen peroxide. A QC check should be performed at the beginning of each day or upon the opening of a new tube.

Certain heavy metals, such as hexavalent chromium, cause false positives for this test. The result is usually green or black. However, the intended purpose of the peroxide strip test is to determine the presence of

organic peroxides. Heavy metals usually are not present in drums which contain organic peroxide compounds.

Another interference for this test is sample matrices that are dark in color (particularly blue). Dark colors often make the strips difficult to read. This problem may be alleviated by diluting the sample.

6.8 Oxidizer Test

Immerse an oxidizer (potassium iodide-starch) test strip into the culture tube containing the water solubility test until the test strip has been wetted by the contents. Remove the test strip from the tube and add one drop of 5% hydrochloric acid to the strip. Wait 2 to 4 minutes and check the strip. The development of a blue-black color on the strip indicates a positive result. Record the result as a positive (+) or a negative (-).

A quality control check of the oxidizer strips is performed in the same manner and with the same frequency as for the peroxide strips (Section 6.7).

Dark colored samples (particularly blue, purple, and black) interfere with this test. The sample should be diluted if this situation occurs.

6.9 Cyanide Test

Many different test kits are available on the market for screening a sample for the presence of cyanide compounds. The Merck cyanide test kits are preferred because they are quick and easy to use. Always read the instructions provided with any test kit that is used.

The Merck cyanide test kit is based upon the pyridine barbituric acid colorimetric test. To perform this test, fill the vial provided with 5 ml of sample or water extract. Add 25% sulfuric acid if the pH of the sample was greater than 9, until the pH drops to 6-7 (usually one small drop is enough). Add one level dosing spoon of Reagent 1 until completely dissolved. Add five drops of Reagent 2 and shake well. Immerse the reaction zone of a test strip into the liquid for 30 seconds. Remove the strip and shake/wipe off excess liquid. Immediately compare the strip against the color chart on the side of the test strip tube, a positive result is purple.

This test has the following interferences:

- Copper, palladium, mercury, and silver cyanide compounds are only partially detected.

- Complex cyanides (isocyanates, ferrocyanates) are not detected.
- Bromides and iodides decrease the intensity of the color.
- Strong reducing agents interfere with the reaction because one of the main reagents used in the test is chloramine-T, an oxidizer. Examples of reducing agents are sugars and sodium thiosulfate.
- The presence of strong sulfides also causes a false positive. Sulfides can be removed by cadmium carbonate, if available.
- Dark colored samples also interfere with this test. The sample should be diluted if this problem occurs.

Samples that have either a low pH or test positive on the oxidizer test do not have to be tested for cyanides.

6.10 Sulfide Test

Immerse a sulfide (lead acetate) test strip into the culture tube that contains the water solubility test until the test strip has been wetted by the water fraction (if the sample is insoluble) or the contents of the tube (if the sample is soluble). After removing the test strip from the culture tube, add one drop of 5% hydrochloric acid to the strip. A change of color to brown-black indicates the presence of sulfide compounds. Record the result as either a positive (+) or a negative (-).

Dark colored samples (particularly brown and black) interfere with this test. This problem may be alleviated by further diluting the sample.

Samples that have either a low pH or test positive on the oxidizer test do not have to be tested for sulfides.

6.11 Bielstein Test

Break off a piece of copper wire approximately 6 inches long and loop one of the ends. Wrap the other end around a tongue depressor. Place the loop of the wire into the sample and then place the loop into the tip of the flame of a propane torch. The presence of a green flame indicates a positive result. This test may also result in other colors. These colors should be noted when recording the results.

Use a dark background when observing the results.

Ensure that the wire is cooled and rinsed between samples. This is accomplished by dowsing the loop end of the wire with water. Inserting a hot wire into a sample may result in ignition of the sample.

It is not necessary to have the propane torch on the highest setting.

Low pH samples may result in a false positive because they corrode the copper wire and the elemental copper yields a green flame.

Certain nitrogen non-halogenated compounds may yield a green flame. Examples of these compounds are quinoline, pyridine derivatives, organic acids, urea, and copper cyanide.

6.12 Flash Point

Dip either the end of a spatula or a tongue depressor (split in half lengthwise) into your sample. Place the tip of the spatula/tongue depressor in the flame of a propane torch set on low. If the sample begins burning, immediately remove it from the flame. The sample should be considered to be flammable, if it continues burning. If the flame extinguishes slowly, consider the sample combustible. When a tongue depressor is used, ensure that the sample is burning and not the tongue depressor.

An alternate method is to place a small amount of the sample on a watch glass. A lighted match is then passed over the sample. If the sample ignites, it is flammable.

7.0 EQUIPMENT

Materials required to perform Hazcat testing include the following.

- Hood with a fan
- PID or FID
- Cyanide and sulfide monotoxes
- Distilled water
- Hexane, dichloromethane, or ethyl acetate
- 5% hydrochloric acid
- Polyethylene squeeze bottles
- Tongue depressors, wood
- Spatula, stainless steel
- Culture tubes (16mm x 125mm or 16mm x 150mm)
- Polyethylene transfer pipets
- Watch glasses

- 8-oz. jars
- 32-oz. jars
- pH test strips, range 0-14
- Potassium iodide-starch test strips
- Lead acetate test strips
- Peroxide test strips
- Cyanide test kits
- Copper wire, 16 to 20 gauge
- Test tube racks (16mm width)
- Propane torch with a flow control valve
- Bench liner
- Fire extinguisher
- Eyewash station or bottle
- Safety glasses
- Safety shower
- Fire blanket
- Latex or nitrile gloves
- Indelible ink pens
- Trash bags
- Ultra fine point permanent markers
- 11-in. x 17-in. columnar ledger sheets
- Tyvek coveralls or laboratory coat
- Vortex genie (optional)

8.0 ATTACHMENTS

A Drum/Container Sampling Log
B Addendum - Test for Reactive Cyanide
C Material Safety Data Sheet

ATTACHMENT A

Container No. _____

Waste Stream _____

DRUM/CONTAINER SAMPLING LOG

GENERAL INFORMATION

Site Name: _____ Location: _____ Samplers: _____

Date: _____ Time: _____ _____

DRUM/CONTAINER INFORMATION *(circle all that apply)*

Type: Drum Vat Pit Tank

Construction: Steel Poly Fiber Poly-lined Open-top Closed-top Other: _____

Total Volume: 85 gal 55 gal 30 gal 10 gal 5 gal Other: _____

Waste Volume: 100% 75% 50% 25% <25% Empty Other: _____

Field Screening: OVA/HNu _____ %LEL _____ $\%O_2$ _____ Rad. Meter _____ pH _____

Condition: Poor Fair Good

DRUM/CONTAINER CONTENTS

Layer	*Color*	*Clarity*	*Physical State*	*% of Total Volume*
Top				
Middle				
Bottom				

Clarity choices are clear, cloudy or opaque

DRUM/CONTAINER LABELING INFORMATION

Manufacturer Name: _____ Chemical Name: _____

Other Information: _____

Container Number: _____

Sample Description

Layer	*Color*	*Clarity*	*Physical State*
Top			
Middle			
Bottom			

Abbreviations: OPQ = Opaque CLR = Clear CDY = Cloudy LIQ = Liquid SOL = Solid SDG = Sludge

Hazard Categorization Testing Results

Layer	Water Sol.	Hex. Sol.	React.	PH	Per.	Oxid.	CN	Sulf.	Cl	Flam.
Top										
Middle										
Bottom										

Solubility Abbreviations: S = Soluble I = Insoluble PS = Partially Soluble IL = Insoluble, Lighter IH = Insoluble, Heavier

Reactivity Abbreviations: ~~A~~ = Air Reactive ~~W~~ = Water Reactive - = No Reaction

Test Results: + = Positive result - = Negative result

Additional Test Performed (Result): _____

Comments: _____

Waste Streams: Top _____

Middle _____

Bottom _____

Analyst _____ Date: _____

ATTACHMENT B

ADDENDUM -TEST FOR REACTIVE CYANIDE

OVERVIEW

This procedure may be used for any sample that tests positive for cyanide and requires further classification as to the reactivity of the cyano-species present.

REACTIVE CYANIDE TEST

Place 1 gram of sample into a clean culture tube. If the pH is less than 9, add 5 ml of 0.25 N NaOH. Immediately place stopper on the tube and mix gently. After 5 minutes, using tweezers, insert a cyanide test strip that has been wetted with distilled water into the tube above the liquid (do not allow test strip to come in contact with the liquid at the bottom of the tube). Remove the strip and compare the color change of the strip against the color chart. Purple color indicates the presence of reactive cyanide.

Next add 6N Hydrochloric acid drop-wise until the solution pH is equal to 2 (should be approximately 2 - 3 drops). Immediately place stopper on the tube and mix gently. After 5 minutes, using tweezers, insert a cyanide test strip that has been wetted with distilled water into the tube above the liquid (do not allow the test strip to come in contact with the liquid at the bottom of the tube). Remove the strip and compare the color change of the strip against the color chart. Purple color indicates the presence of reactive cyanide.

If the pH of the sample to be tested is greater than 9, the addition of 0.25N NaOH is not required. The sample should be adjusted to pH = 2, and then tested as specified above.

ATTACHMENT C

MATERIAL SAFETY DATA SHEET

**** MATERIAL SAFETY DATA SHEET ****

Barbituric Acid
000002264

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Barbituric Acid

2,4,(1H,3H,5H)-pyrimidinetrione
Company Identification: Acros Organics
Janssen Pharmaceuticalaan 3
2440 Geel, Belgium
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies outside the US, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	Einecs#
67-52-7	Barbituric acid	100	2006580

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: White or off-white crystalline solid.
Caution! Contact with eyes or skin may cause mechanical irritation.
May cause respiratory tract irritation. Ingestion of large amounts
may cause digestive tract irritation. This chemical is expected to be
a low hazard for usual industrial handling.
Appearance: White or off-white crystalline solid.
Target Organs: None.

Potential Health Effects

Eye:
Dust may cause mechanical irritation.

Skin:
Dust may cause mechanical irritation.
Low hazard for usual industrial handling.

Ingestion:
Ingestion of large amounts may cause gastrointestinal irritation.
Expected to be a low ingestion hazard.

Inhalation:
May cause respiratory tract irritation.
Low hazard for usual industrial handling.

Chronic:
No information found.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids.
Get medical aid.

Skin:
Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.
Get medical aid if irritation develops or persists.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water.
Never give anything by mouth to an unconscious person.
Get medical aid.

Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Get medical aid if cough or other symptoms appear.

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.

Extinguishing Media:
In case of fire, use water, dry chemical, chemical foam, or alcohol-resistant foam.

Autoignition Temperature: Not applicable.

Flash Point: Not applicable.

Explosion Limits, Lower: Not available.
Upper: Not available.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equipiment as indicated in Section 8.

Spills/Leaks:
Sweep up, then place into a suitable container for disposal. Avoid generating dusty conditions.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Use with adequate ventilation.
Avoid contact with eyes, skin, and clothing.
Avoid ingestion and inhalation.

Storage:
Store in a cool, dry place.
Keep from contact with oxidizing materials.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:
Use adequate ventilation to keep airborne concentrations low.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Barbituric acid	none listed	none listed	none listed

OSHA Vacated PELs:

Barbituric acid:

No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:

Wear appropriate protective gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to minimize contact with skin.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1010.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Solid
Appearance:	White or off-white crystalline solid.
Odor:	Odorless.
pH:	Strong acid in sol.
Vapor Pressure:	Negligible.
Vapor Density:	Not available.
Evaporation Rate:	Negligible.
Viscosity:	Not available.
Boiling Point:	500.F
Freezing/Melting Point:	478.F
Decomposition Temperature:	478.F
Solubility:	Slightly soluble in water.
Specific Gravity/Density:	Not available.
Molecular Formula:	C4H4N2O3
Molecular Weight:	128.0396

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:

Stable. However, may decompose if heated.

Conditions to Avoid:

High temperatures, strong oxidants.

Incompatibilities with Other Materials:

Strong oxidizing agents.

Hazardous Decomposition Products:

Nitrogen oxides, carbon monoxide, carbon dioxide.

Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:

CAS# 67-52-7: CP8000000

LD50/LC50:
Not available.
Carcinogenicity:
Barbituric acid
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
No components are listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No data available.
Teratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Not available.
Environmental Fate:
Not available.
Physical/Chemical:
Not available.
Physical/Chemical:
Not available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: Not listed.
RCRA D-Series Chronic Toxicity Reference Levels: Not listed.
RCRA F-Series: Not listed.
RCRA P-Series: Not listed.
RCRA U-Series: Not listed.
Not listed as a material banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
No information available
IMO
Not regulated as a hazardous material.
IATA
Not regulated as a hazardous material.
RID/ADR
Not regulated as a hazardous material.
Canadian TDG
No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

A. Federal
TSCA
CAS# 67-52-7 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA/SARA

Section 302 (RQ)

None of the chemicals in this material have an RQ.

Section 302 (TPQ)

None of the chemicals in this product have a TPQ.

Section 313

No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

B. State

Not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level:
None of the chemicals in this product are listed.

C. International

Canada

CAS# 67-52-7 is listed on Canada's DSL/NDSL List.
CAS# 67-52-7 is not listed on Canada's Ingredient Disclosure List.

European Labeling in Accordance with EC Directives

Hazard Symbols: Not available.
Risk Phrases:
Safety Phrases:

**** SECTION 16 - ADDITIONAL INFORMATION ****

Additional Information:

No additional information available.

MSDS Creation Date: March 23, 1995

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

**** MATERIAL SAFETY DATA SHEET ****

Pyridine
000019990

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Pyridine

41854-5000, 1032606, 1032614, 1032689, 1032705, 1154061, 1154681, 1167022, 1167048, 1468313, 1468453, 1595081, 1796994, EK 103 2689, EK 103 2705, EK 116 7022, EK 116 7048, EK 159 5081, EK 179 6994

Synonyms:

Azabenzene; Azine

Company Identification: Acros Organics
Janssen Pharmaceuticalaan 3
2440 Geel, Belgium

For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies outside the US, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	Einecs#
110-86-1	PYRIDINE	100	203-809-9

Hazard Symbols: XN F
Risk Phrases: 11 20/21/22

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: Clear colorlss liquid. Strong "fishy" odor.
WARNING! Flammable liquid and vapor. Flash point=68.F. May cause eye and skin irritation with possible burns. May be absorbed through the skin. May cause digestive and respiratory tract irritation with possible burns. Ingestion and inhalation may cause central nervous system depression.
Appearance: Clear colorless liquid. Flash Point: 68.F.
Target Organs: Kidneys, central nervous system, liver, bone marrow.

Potential Health Effects

Eye:

Contact with eyes may cause severe irritation, and possible eye burns.

Skin:

May cause skin irritation.
May be absorbed through the skin in harmful amounts.

Ingestion:

May cause central nervous system depression, kidney damage, and

liver damage.
May cause gastrointestinal irritation with nausea, vomiting and diarrhea.
May cause effects similar to those for inhalation exposure.

Inhalation:
Inhalation of high concentrations may cause central nervous system effects characterized by headache, dizziness, unconsciousness and coma.
May cause respiratory tract irritation.
Prolonged exposure may result in dizziness and general weakness.

Chronic:
Prolonged or repeated skin contact may cause dermatitis.
Chronic inhalation and ingestion may cause effects similar to those of acute inhalation and ingestion.
May cause liver and kidney damage.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids.
Get medical aid immediately.

Skin:
Get medical aid immediately.
Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
Do NOT induce vomiting.
If victim is conscious and alert, give 2-4 cupfuls of milk or water.
Never give anything by mouth to an unconscious person.
Get medical aid immediately.

Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Get medical aid.

Notes to Physician:
Treat symptomatically and supportively.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.

Extinguishing Media:
Use water spray to cool fire-exposed containers.
In case of fire, use water fog, dry chemical, carbon dioxide, or regular foam.

Autoignition Temperature: 900.F (482.22.C)
Flash Point: 68.F (20.00.C)
Explosion Limits, Lower: 1.80
Upper: 12.40

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equpiment as indicated in Section 8.

Spills/Leaks:
Absorb spill with inert material, (e.g., dry sand or earth), then place into a chemical waste container. Remove all sources of ignition.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling.
Remove contaminated clothing and wash before reuse.
Use with adequate ventilation.
Follow all MSDS and label precautions even after container is emptied because they may contain product residues.
Use spark-proof tools and explosion proof equipment.
Empty containers retain product residue, (liquid and/or vapor), and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, sparks or open flames.
Do not get on skin or in eyes.
Do not ingest or inhale.

Storage:

Keep away from heat, sparks, and flame.
Store in a cool, dry place.
Store in a tightly closed container.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
PYRIDINE	5 ppm ; 16 mg/m3	5 ppm TWA; 15 mg/m3 TWA	5 ppm TWA; 15 mg/m3 TWA

OSHA Vacated PELs:

PYRIDINE:
5 ppm TWA; 15 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear safety glasses and chemical goggles if splashing is possible.

Skin:
Wear appropriate protective gloves and clothing to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to minimize contact with skin.

Respirators:
Wear a NIOSH/MSHA-approved (or equivalent) full-facepiece airline respirator in the positive pressure mode with emergency escape provisions.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	Clear colorless liquid
Odor:	Strong "fishy" odor.
pH:	8.5 (0.2 M solution)

Vapor Pressure:	20 mm Hg
Vapor Density:	2.73 (Air=1)
Evaporation Rate:	Not available.
Viscosity:	0.95 mPa s 20 C
Boiling Point:	115-116.C
Freezing/Melting Point:	-42.C
Decomposition Temperature:	Not available.
Solubility:	Miscible in water. Volatile in steam.
Specific Gravity/Density:	.9780
Molecular Formula:	C5H5N
Molecular Weight:	79.0417

****** SECTION 10 - STABILITY AND REACTIVITY ******

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials.
Incompatibilities with Other Materials:
Acids; acid chlorides; oxidizing agents; chloroformates; bromine trifluorate; mixtures with formamide, iodine, and sulfur trioxide.
Hazardous Decomposition Products:
Nitrogen oxides, carbon monoxide, carbon dioxide, nitrogen.
Hazardous Polymerization: Will not occur.

****** SECTION 11 - TOXICOLOGICAL INFORMATION ******

RTECS#:
CAS# 110-86-1: UR8400000
LD50/LC50:
Oral, rat: LD50 = 891 mg/kg Skin, rabbit: LD50 = 1121 mg/kg
Carcinogenicity:
PYRIDINE
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
No components are listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
A low number of injection-site tumors were found in rats that received subcutaneous injections of pyridine at doses up to 100 mg/kg/day, twice weekly for a year; however, there were no indications of real oncogenic potential.
Teratogenicity:
No studies in mammals were found. Tests in the hydra did not suggest the material should be tested in mammals.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
Pyridine's mutagenicity potential is equivocal. It was reported to be both positive and negative in Salmonella typhimurium strains. It was not mutagenic in tests for chromosome aberrations, but did give weak positive results in tests that d
Other Studies:
No data available.

****** SECTION 12 - ECOLOGICAL INFORMATION ******

Ecotoxicity:
Not available.
Environmental Fate:
Not available.

Physical/Chemical:
Not available.
Physical/Chemical:
Not available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: waste number D038; regulatory le
RCRA D-Series Chronic Toxicity Reference Levels: chronic toxicity reference level = 0
RCRA F-Series: Not listed.
RCRA P-Series: Not listed.
RCRA U-Series: waste number U196
This material is banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: PYRIDINE - POISON
Hazard Class: 3
UN Number: UN1282
Packing Group: II
IMO
Shipping Name: PYRIDINE
Hazard Class: 3.2
UN Number: 1282
Packing Group: 2
IATA
Shipping Name: PYRIDINE
Hazard Class: 3
UN Number: 1282
Packing Group: 2
RID/ADR
Shipping Name: PYRIDINE
Dangerous Goods Code: 3(3B)
UN Number: 1282
Canadian TDG
Shipping Name: PYRIDINE
Hazard Class: 3(6.1)
UN Number: UN1282
Other Information: FLASHPOINT 17 C

**** SECTION 15 - REGULATORY INFORMATION ****

A. Federal
TSCA
CAS# 110-86-1 is listed on the TSCA inventory.
Health & Safety Reporting List
CAS# 110-86-1: Effective Date: October 4, 1982
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA/SARA
Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
Section 313

Section 313:

This material contains PYRIDINE (CAS# 110-86-1, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

B. State

PYRIDINE can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level:

None of the chemicals in this product are listed.

C. International

Canada

CAS# 110-86-1 is listed on Canada's DSL/NDSL List.
CAS# 110-86-1 is listed on Canada's Ingredient Disclosure List.

European Labeling in Accordance with EC Directives

Hazard Symbols: XN F

Risk Phrases:

R 11 Highly flammable.
R 20/21/22 Harmful by inhalation, in contact with skin and if swallowed.

Safety Phrases:

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 28A After contact with skin, wash immediately with plenty of water.

**** SECTION 16 - ADDITIONAL INFORMATION ****

Additional Information:

No additional information available.

MSDS Creation Date: March 28, 1995

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

**** MATERIAL SAFETY DATA SHEET ****

Sodium Phosphate Monobasic Monohydrate
000015191

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Sodium Phosphate Monobasic Monohydrate

Synonyms:

Company Identification: Acros Organics
Janssen Pharmaceuticalaan 3
2440 Geel, Belgium
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies outside the US, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	Einecs#
10049-21-5	Sodium Phosphate Monobasic Monohydrate		unlisted

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: White crystalline solid
Caution! May cause eye, skin, respiratory and digestive tract irriatation.
Appearance: White crystalline powder.
Target Organs: None.

Potential Health Effects

Eye:
May cause eye irritation.

Skin:
May cause skin irritation.

Ingestion:
Ingestion of large amounts may cause gastrointestinal irritation.

Inhalation:
May cause respiratory tract irritation.

Chronic:
No information found.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes,

occasionally lifting the upper and lower lids.
Get medical aid.

Skin:
Get medical aid.
Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Ingestion:
If victim is conscious and alert, give 2-4 cupfuls of milk or water.
Get medical aid.
DO NOT induce vomiting. Allow the victim to rinse his mouth and then to drink 2-4 cupfuls of water, and seek medical advice.

Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Get medical aid if cough or other symptoms appear.

Notes to Physician:
Treat symptomatically and supportively.
None reported.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Dusts at sufficient concentrations can form explosive mixtures with air.
Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products.

Extinguishing Media:
For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.

Autoignition Temperature: Not available.
Flash Point: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equpiment as indicated in Section 8.

Spills/Leaks:
Vacuum or sweep up material and place into a suitable disposal container. Sweep up, then place into a suitable container for disposal.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:
Use with adequate ventilation.
Avoid prolonged or repeated contact with skin.
Avoid contact with eyes.
Avoid ingestion and inhalation.

Storage:
Store in a tightly closed container.
Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use adequate ventilation to keep airborne concentrations low.
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sodium Phosphate Monobasic Monohydrate	none listed	none listed	none listed

OSHA Vacated PELs:

Sodium Phosphate Monobasic Monohydrate:
No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:

Wear safety glasses and chemical goggles if splashing is possible. Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:

Wear appropriate protective gloves and clothing to prevent skin exposure. Wear appropriate gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to minimize contact with skin.

Respirators:

Wear a NIOSH/MSHA-approved (or equivalent) full-facepiece airline respirator in the positive pressure mode with emergency escape provisions. Follow the OSHA respirator regulations found in 29CFR 1010.134. Always use a NIOSH-appro

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Not available.
Appearance:	White crystalline powder
Odor:	Not available.
pH:	4.4-4.5
Vapor Pressure:	Not available.
Vapor Density:	Not available.
Evaporation Rate:	Not available.
Viscosity:	Not available.
Boiling Point:	Not available.
Freezing/Melting Point:	100.00.C
Decomposition Temperature:	100.C
Solubility:	1103 g/l (20 C)
Specific Gravity/Density:	Not available.
Molecular Formula:	H2 Na O4 P . H2 O
Molecular Weight:	Not available.

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:

Stable. Stable under normal temperatures and pressures.

Conditions to Avoid:

None reported.
Incompatibilities with Other Materials:
None reported with common materials.
Hazardous Decomposition Products:
Carbon monoxide, oxides of phosphorus, carbon dioxide.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 10049-21-5 unlisted.
LD50/LC50:
CAS# 10049-21-5: Not available.
Carcinogenicity:
Sodium Phosphate Monobasic Monohydrate
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
No components are listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No data available.
Teratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
No information found.
Environmental Fate:
No information found.
Physical/Chemical:
No information found.
Physical/Chemical:
No information found.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: Not listed.
RCRA D-Series Chronic Toxicity Reference Levels: Not listed.
RCRA F-Series: Not listed.
RCRA P-Series: Not listed.
RCRA U-Series: Not listed.
Not listed as a material banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
No information available
IMO
Not regulated as a hazardous material.
IATA
Not regulated as a hazardous material.
RID/ADR
Not regulated as a hazardous material.

Canadian TDG

No information available.

**** SECTION 15 - REGULATORY INFORMATION ****

A. Federal

TSCA

CAS# 10049-21-5 is not on the TSCA Inventory. It is a hydrate and exempt from TSCA Inventory requirements (40CFR270.3(u)(2)).

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA/SARA

Section 302 (RQ)

None of the chemicals in this material have an RQ.

Section 302 (TPQ)

None of the chemicals in this product have a TPQ.

Section 313

No chemicals are reportable under Section 313.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

B. State

Not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level:
None of the chemicals in this product are listed.

C. International

Canada

None of the chemicals in this product are listed on the DSL/NDSL list.
CAS# 10049-21-5 is not listed on Canada's Ingredient Disclosure List.

European Labeling in Accordance with EC Directives

Hazard Symbols: Not available.
Risk Phrases:
Safety Phrases:

**** SECTION 16 - ADDITIONAL INFORMATION ****

Additional Information:

No additional information available.

MSDS Creation Date: June 13, 1995

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the

information for their particular purposes.

****** MATERIAL SAFETY DATA SHEET ******

Hexane
000010950

****** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ******

MSDS Name: Hexane

EK 195 1490
Synonyms:
Dipropyl, hexyl hydride, n-hexane.
Company Identification: Acros Organics
Janssen Pharmaceuticalaan 3
2440 Geel, Belgium
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies outside the US, call: 0032(0) 14575299

****** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ******

CAS#	Chemical Name	%	Einecs#
110-54-3	Hexane	>85%	203-777-6

****** SECTION 3 - HAZARDS IDENTIFICATION ******

EMERGENCY OVERVIEW

Appearance: Colorless liquid with a mild gasoline odor.
Danger! Extremely flammable liquid, FP=-7.6F. Eye contact produces irritation. Skin contact causes immediate burning irritation and blistering. Liquid and vapor may be absorbed through skin.
Ingestion poses an aspiration hazard with possible asphyxia, brain damage, and cardiac arrest. Inhalation produces nervous system and visual disturbances. Substance has caused adverse birth and reproductive effects in lab animals.
Appearance: Colorless. Flash Point: -7.6 F.
Target Organs: Heart, muscles, nervous system.

Potential Health Effects

Eye:
Contact produces irritation, tearing, and burning pain.

Skin:
May be absorbed through the skin in harmful amounts.
Contact causes immediate redness, painful burning, and possible blistering. Substance in vapor form may also absorbed.

Ingestion:
Aspiration hazard.
Aspiration can cause asphyxia, brain damage, and cardiac arrest.

Exposure may cause cardiac sensitization.

Inhalation:

Exposure produces central nervous system depression.
Exposure may cause vertigo, hallucinations, fatigue, muscle weakness, visual disturbances, and nervous system disturbances.

Chronic:

Prolonged or repeated exposure may cause adverse reproductive effects.
Repeated exposure may cause nervous system abnormalities with muscle weakness and damage, motor incoordination, and sensation disturbances. Visual abnormalities have also been reported.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids.
Get medical aid immediately.
Do NOT allow victim to rub or keep eyes closed.

Skin:

Get medical aid if irritation develops or persists.
Rinse area with large amounts of water for at least 15 minutes.
Remove contaminated clothing and shoes.

Ingestion:

Do NOT induce vomiting.
If victim is conscious and alert, give 2-4 cupfuls of milk or water.
Possible aspiration hazard.
Get medical aid immediately.

Inhalation:

Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Get medical aid.

Notes to Physician:

Treat symptomatically and supportively.
No specific antidote exists.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Vapors can travel to a source of ignition and flash back.
Extremely flammable. Material will readily ignite at room temperature.
Use water spray to keep fire-exposed containers cool.
Containers may explode in the heat of a fire.

Extinguishing Media:

For small fires, use water spray, dry chemical, carbon dioxide or chemical foam.
Use water spray to cool fire-exposed containers.

Autoignition Temperature: 437.F (225.00.C)
Flash Point: -7.6.F (-22.00.C)
Explosion Limits, Lower: 1.2
Upper: 7.5

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equpiment as indicated in Section 8.

Spills/Leaks:

Wear a self contained breathing apparatus and appropriate Personal protection. (See Exposure Controls, Personal Protection section). Scoop up with a nonsparking tool, then place into a suitable container for disposal. Remove all sources o

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling.
Remove contaminated clothing and wash before reuse.
Use only in a well ventilated area.
Ground and bond containers when transferring material.
Use spark-proof tools and explosion proof equipment.
Avoid contact with heat, sparks and flame.
Do not get on skin or in eyes.
Do not ingest or inhale.

Storage:

Keep away from sources of ignition.
Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use explosion-proof ventilation equipment.
Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hexane	50 ppm ; 176 mg/m3	50 ppm TWA; 180 mg/m3 TWA	500 ppm TWA; 1800 mg/m3 TWA

OSHA Vacated PELs:

Hexane:
50 ppm TWA; 180 mg/m3 TWA

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear an impervious apron.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1010.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Liquid
Appearance: Colorless.
Odor: Mild gasoline type.

pH:	Neutral.
Vapor Pressure:	150 mm Hg @27C
Vapor Density:	3.0 (air=1)
Evaporation Rate:	Not available.
Viscosity:	0.31 cP @27C.
Boiling Point:	156.F
Freezing/Melting Point:	-139.F
Decomposition Temperature:	Not available.
Solubility:	0.014% @20C.
Specific Gravity/Density:	0.66 (water=1)
Molecular Formula:	C6H14
Molecular Weight:	86.098

****** SECTION 10 - STABILITY AND REACTIVITY ******

Chemical Stability:
Stable at room temperature in closed containers under normal storage and handling conditions.
Conditions to Avoid:
Incompatible materials, ignition sources, excess heat.
Incompatibilities with Other Materials:
Dinitrogen tetroxide and strong oxidizers.
Hazardous Decomposition Products:
Acrid smoke and fumes.
Hazardous Polymerization: Has not been reported.

****** SECTION 11 - TOXICOLOGICAL INFORMATION ******

RTECS#:
CAS# 110-54-3: MN9275000
LD50/LC50:
Oral, rat: LD50 = 28710 mg/kg
Carcinogenicity:
Hexane
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
No components are listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No information available.
Teratogenicity:
Effects on Newborn: reduced weight gain, ihl-rat TCLo=1000 ppm/6H.
Embryo or Fetus: Stunted fetus, ihl-rat TCLo=5000 ppm/20H.
Reproductive Effects:
Paternal Effects: Testes/sperm duct/epididymis, ihl-rat TCLo=1 pph/6H.
Neurotoxicity:
No information available.
Mutagenicity:
No information available.
Other Studies:
None.

****** SECTION 12 - ECOLOGICAL INFORMATION ******

Ecotoxicity:
No information available.
Environmental Fate:
Substance readily volatilizes when released on soil or to water (with minor absorption to soil or sediment). The potential for aquatic bioconcentration is low. In air, substance is predicted to exist in vapor phase and will react with photochemically produced hydroxyl radicals.

Physical/Chemical:
No information available.
Physical/Chemical:
None.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: Not listed.
RCRA D-Series Chronic Toxicity Reference Levels: Not listed.
RCRA F-Series: Not listed.
RCRA P-Series: Not listed.
RCRA U-Series: Not listed.
Not listed as a material banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: HEXANES
Hazard Class: 3
UN Number: UN1208
Packing Group: II
IMO
Shipping Name: HEXANES
Hazard Class: 3.1
UN Number: 1208
Packing Group: 2
IATA
Shipping Name: HEXANES
Hazard Class: 3
UN Number: 1208
Packing Group: 2
RID/ADR
Shipping Name: HEXANES
Dangerous Goods Code: 3(3B)
UN Number: 1208
Canadian TDG
Shipping Name: HEXANES
Hazard Class: 3
UN Number: UN1208
Other Information: FLASHPOINT -22C

**** SECTION 15 - REGULATORY INFORMATION ****

A. Federal
TSCA
CAS# 110-54-3 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA/SARA
Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
None of the chemicals in this product have a TPQ.
Section 313

No chemicals are reportable under Section 313.

Clean Air Act:

CAS# 110-54-3 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

B. State

Hexane can be found on the following state right to know lists: New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
California No Significant Risk Level:
None of the chemicals in this product are listed.

C. International

Canada

CAS# 110-54-3 is listed on Canada's DSL/NDSL List.
CAS# 110-54-3 is listed on Canada's Ingredient Disclosure List.

European Labeling in Accordance with EC Directives

Hazard Symbols: Not available.
Risk Phrases:
Safety Phrases:

**** SECTION 16 - ADDITIONAL INFORMATION ****

Additional Information:

No additional information available.

MSDS Creation Date: February 2, 1995
The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

Chloramine-T trihydrate, 98%

Acros Catalog #s: AC227850010 AC227850250 AC227852500
*** This product is for research and development purposes only. ***

711 Forbes Avenue
Pittsburgh, PA 15219-4785
1-800-ACROS-01 (1-800-227-6701)
For Emergency Transportation Information call CHEMTREC: 800-424-9300

Date of Preparation: 03/22/86 Accession Number: 901022
Modified by Fisher Scientific: 12/94

SECTION I. IDENTIFICATION

- Product Name: Chloramine-T
- Synonym(s): N-Chloro-4-methylbenzenesulfonamide Sodium Salt
- Formula: C7 H7 Cl N Na O2 S
- CAT No(s): 109 7971; 109 7997; 109 8003
- Chem. No(s): 01022

SECTION II. PRODUCT AND COMPONENT HAZARD DATA

COMPONENT(S):	Percent	TLV(R)	CAS Reg. No.
Chloramine-T	approx 100	---	127-65-1

SECTION III. PHYSICAL DATA

- Appearance: White crystalline solid
- Melting Point: Not Available
- Vapor Pressure: Negligible
- Evaporation Rate (n-butyl acetate = 1): Negligible
- Volatile Fraction by Weight: Negligible
- Specific Gravity (H2O = 1): Not Available
- Solubility in Water (by Weight): Appreciable

SECTION IV. FIRE AND EXPLOSION HAZARD DATA

- Flash Point: Not Applicable
- Extinguishing Media: Water spray; Dry chemical; CO2
- Special Fire Fighting Procedures: Wear self-contained breathing apparatus and protective clothing. Use water spray to keep fire exposed containers cool.
- Unusual Fire and Explosion Hazards: Fire or excessive heat may produce hazardous decomposition products. This material in sufficient quantity and reduced particle size is capable of creating a dust explosion.

SECTION V. REACTIVITY DATA

- Stability: Stable, however, can decompose above 100 C. Avoid temperatures above 50 C.

- Incompatibility: Strong oxidizers
- Hazardous Decomposition Products: Combustion will produce CO2 and probably CO. Hydrogen chloride gas and oxides of sulfur and nitrogen may also be present.
- Hazardous Polymerization: Will not occur.

R-0075.400B 86-6651

SECTION VI. TOXICITY AND HEALTH HAZARD DATA

A. EXPOSURE LIMITS: Not established.

B. EXPOSURE EFFECTS:
Inhalation: Harmful if inhaled. Dust extremely irritating.
Skin: Causes irritation. Can cause allergic skin reaction.
Eye: Causes irritation.
Ingestion: Harmful if swallowed.

C. FIRST AID:
Inhalation: Remove to fresh air. Treat symptomatically. If symptoms are present get medical attention.
Skin: Immediately flush skin with plenty of water for at least 15 minutes. Get medical attention if symptoms are present after washing.
Eye: Immediately flush eyes with plenty of water for at least 15 minutes and get medical attention.
Ingestion: Drink 1-2 glasses of milk or water and induce vomiting. Call a physician immediately.

SECTION VII. VENTILATION AND PERSONAL PROTECTION

A. VENTILATION:
Good general room ventilation should be used. Local exhaust may be needed.

B. RESPIRATORY PROTECTION:
A NIOSH-approved dust respirator should be worn, if needed.

C. SKIN AND EYE PROTECTION:
Protective gloves and clothing should be worn. Safety glasses, goggles, or a face shield should be worn.

SECTION VIII. SPECIAL STORAGE AND HANDLING PRECAUTIONS

Fire or excessive heat may cause explosive decomposition if confined. Keep from contact with oxidizing materials. Store in cool place.

SECTION IX. SPILL, LEAK, AND DISPOSAL PROCEDURES

Sweep up material and package for safe feed to an incinerator. Dispose by incineration or contract with licensed chemical waste disposal agency. Discharge, treatment, or disposal may be subject to federal, state or local laws.

The information contained herein is furnished without warranty of any kind. Users should consider these data only as a supplement to other information gathered by them and must make independent determinations of the suitability and completeness of information from all sources to assure proper use and disposal of these materials and the safety and health of employees and customers.

**** MATERIAL SAFETY DATA SHEET ****

Hydrochloric Acid
000011155

**** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ****

MSDS Name: Hydrochloric Acid

1146414, 1299320, 1650092, EK 114 6372, EK 114 6414, EK 129 9320, EK 165 0092

Synonyms:
Chlorohydric acid, hydrogen chloride, muriatic acid, spirits of salt.

Company Identification: Acros Organics
Janssen Pharmaceuticalaan 3
2440 Geel, Belgium

For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies outside the US, call: 0032(0) 14575299

**** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ****

CAS#	Chemical Name	%	Einecs#
7647-01-0	Hydrogen chloride	36-38%	unlisted
7732-18-5	Water	62-64%	unlisted

**** SECTION 3 - HAZARDS IDENTIFICATION ****

EMERGENCY OVERVIEW

Appearance: Clear, colorless to faintly yellow liquid with a strong, pungent odor.
Danger. Corrosive. Contact with liquid causes eye and skin burns. Vapor may cause eye and skin burns. Inhalation causes severe respiratory tract irritation with coughing, choking, and possible burns. Ingestion causes severe irritation and burns of the digestive tract with possible permanent damage and tissue destruction. Repeated exposure may cause tooth erosion and photosensitization.
Appearance: Clear, colorless to faintly yellow.
Target Organs: None.

Potential Health Effects

Eye:
May cause irreversible eye injury.
Vapor or mist may cause irritation and severe burns.
Contact with liquid is corrosive to the eyes and causes severe burns.

Skin:
May be absorbed through the skin in harmful amounts.

Contact with liquid is corrosive and causes severe burns and ulceration.

Ingestion:
May cause circulatory system failure.
Causes severe digestive tract burns with abdominal pain, vomiting, and possible death.
May cause corrosion and permanent tissue destruction of the esophagus and digestive tract.

Inhalation:
Causes severe irritation of upper respiratory tract with coughing, burns, breathing difficulty, and possible coma.
May cause pulmonary edema and severe respiratory disturbances.

Chronic:
Prolonged or repeated skin contact may cause dermatitis.
Repeated exposure may cause erosion of teeth.
May cause conjunctivitis and photosensitization.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:
Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids.
Get medical aid immediately.
Do NOT allow victim to rub or keep eyes closed.

Skin:
Get medical aid.
Rinse area with large amounts of water for at least 15 minutes.
Remove contaminated clothing and shoes.

Ingestion:
Do NOT induce vomiting.
If victim is conscious and alert, give 2-4 cupfuls of milk or water.
Get medical aid immediately.

Inhalation:
Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Get medical aid.

Notes to Physician:
Treat symptomatically and supportively.
No specific antidote exists.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:
As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Not flammable, but reacts with most metals to form flammable hydrogen gas.
Use water spray to keep fire-exposed containers cool.

Extinguishing Media:
Substance is nonflammable; use agent most appropriate to extinguish surrounding fire.

Autoignition Temperature: Not available.
Flash Point: Not available.
Explosion Limits, Lower: Not available.
Upper: Not available.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equpiment as indicated in Section 8.

Spills/Leaks:

Large spills may be neutralized with dilute alkaline solutions of soda ash, or lime. Absorb spill using an absorbent, non-combustible material such as earth, sand, or vermiculite.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling.
Remove contaminated clothing and wash before reuse.
Use with adequate ventilation.
Do not get on skin or in eyes.
Do not ingest or inhale.

Storage:

Keep away from heat and flame.
Do not store in direct sunlight.
Store in a cool, dry, well-ventilated area away from incompatible substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hydrogen chloride	C 5 ppm; C 7.5 mg/m3	C 5 ppm; C 7 mg/m3	C 5 ppm; C 7 mg/m3
Water	none listed	none listed	none listed

OSHA Vacated PELs:

Hydrogen chloride:
C 5 ppm; C 7 mg/m3
Water:
No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes:
Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:
Wear appropriate protective gloves to prevent skin exposure.

Clothing:
Wear appropriate protective clothing to prevent skin exposure.

Respirators:
Follow the OSHA respirator regulations found in 29CFR 1010.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State: Liquid

Appearance:	Clear, colorless to faintly yellow.
Odor:	Strong, pungent.
pH:	1.1 (0.1N sol).
Vapor Pressure:	160 mm Hg
Vapor Density:	1.257 (Air=1)
Evaporation Rate:	2.0 (Butyl acetate=1)
Viscosity:	Not available.
Boiling Point:	230.F
Freezing/Melting Point:	-101.F
Decomposition Temperature:	3239.6.F
Solubility:	823g/L water at 32F.
Specific Gravity/Density:	1.19 (Water=1)
Molecular Formula:	HCl
Molecular Weight:	36.46

****** SECTION 10 - STABILITY AND REACTIVITY ******

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, light.
Incompatibilities with Other Materials:
Acetate, acetic anhydride, alcohols + hydrogen cyanide, 2-aminoethanol, ammonium hydroxide, calcium carbide, calcium phosphide, cesium acetylene carbide, cesium carbide, chlorosulfonic acid, 1,1-difluoroethylene, ethylene diamine, ethyleneimine, fluorine, lithium silicide, magnesium boride, mercuric sulfate, oleum, perchloric acid, potassium permanganate, b-propiolactone, propylene oxide, rubidum acetylene carbide, rubidum carbide, silver perchlorate + carbon tetrachloride, sodium, sodium hydroxide, sulfuric acid, uranium phosphide, vinyl acetate.
Substance polymerizes on contact with aldehydes or epoxides.
Hazardous Decomposition Products:
Hydrogen chloride, hydrogen gas.
Hazardous Polymerization: May occur.

****** SECTION 11 - TOXICOLOGICAL INFORMATION ******

RTECS#:
CAS# 7647-01-0: MW4025000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
Inhalation, rat: LC50 = 3124 ppm 1 hr. Oral, rabbit: LD50 = 900 mg/kg
Carcinogenicity:
Hydrogen chloride
ACGIH: (A2)-suspected human carcinogen
California: carcinogen
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Possible Select carcinogen
IARC: Group 3 carcinogen
Water
Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
No components are listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
No information available.
Teratogenicity:
Embryo or Fetus: Stunted fetus, ihl-rat TCLo=450 mg/m3/1H Specific Developmental Abnormalities: homeostasis, ihl-rat TCLo=450 mg/m3/1H.
Reproductive Effects:
No information available

Neurotoxicity:
No information available.
Mutagenicity:
No information available.
Other Studies:
None.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Trout LC100=10 mg/L/24H
Shrimp LC50=100-330 ppm
Starfish LC50=100-330mg/L/48H
Shore crab LC50=240 mg/L/48H
Chronic plant toxicity=100 ppm
Environmental Fate:
Substance will neutralize soil carbonate-based components.
Physical/Chemical:
No information available.
Physical/Chemical:
None.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: Not listed.
RCRA D-Series Chronic Toxicity Reference Levels: Not listed.
RCRA F-Series: Not listed.
RCRA P-Series: Not listed.
RCRA U-Series: Not listed.
Not listed as a material banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: HYDROCHLORIC ACID, SOLUTION
Hazard Class: 8
UN Number: UN1789
Packing Group: II
IMO
Shipping Name: HYDROCHLORIC ACID, SOLUTION
Hazard Class: 8
UN Number: 1789
Packing Group: 2
IATA
Shipping Name: HYDROCHLORIC ACID SOLUTION
Hazard Class: 8
UN Number: 1789
Packing Group: 2
RID/ADR
Shipping Name: HYDROCHLORIC ACID SOLUTION
Dangerous Goods Code: 8(5B)
UN Number: 1789
Canadian TDG
Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8(9.2)
UN Number: UN1789

**** SECTION 15 - REGULATORY INFORMATION ****

A. Federal

TSCA

CAS# 7647-01-0 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA/SARA

Section 302 (RQ)

None of the chemicals in this material have an RQ.

Section 302 (TPQ)

CAS# 7647-01-0: TPQ = 500 pounds

Section 313

Section 313:

This material contains Hydrogen chloride (CAS# 7647-01-0, 36-38%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP).
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

CAS# 7647-01-0 is considered highly hazardous by OSHA.

B. State

Hydrogen chloride can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
Not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level:
None of the chemicals in this product are listed.

C. International

Canada

CAS# 7647-01-0 is listed on Canada's DSL/NDSL List.
CAS# 7732-18-5 is listed on Canada's DSL/NDSL List.
CAS# 7647-01-0 is listed on Canada's Ingredient Disclosure List.
CAS# 7732-18-5 is not listed on Canada's Ingredient Disclosure List.

European Labeling in Accordance with EC Directives

Hazard Symbols: Not available.
Risk Phrases:
Safety Phrases:

****** SECTION 16 - ADDITIONAL INFORMATION ******

Additional Information:

No additional information available.

MSDS Creation Date: January 9, 1995

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

****** MATERIAL SAFETY DATA SHEET ******

Sulfuric Acid
000022350

****** SECTION 1 - CHEMICAL PRODUCT AND COMPANY IDENTIFICATION ******

MSDS Name: Sulfuric Acid

EK 114 6919, EK 802 4614
Synonyms:
Hydrogen Sulfate, Oil of Vitriol, Vitriol Brown Oil, Matting Acid, Battery Acid
Company Identification: Acros Organics
Janssen Pharmaceuticalaan 3
2440 Geel, Belgium
For information in North America, call: 800-ACROS-01
For information in Europe, call: 0032(0) 14575211
For emergencies in the US, call CHEMTREC: 800-424-9300
For emergencies outside the US, call: 0032(0) 14575299

****** SECTION 2 - COMPOSITION, INFORMATION ON INGREDIENTS ******

CAS#	Chemical Name	%	Einecs#
7664-93-9	Sulfuric acid	95-98.0%	unlisted

****** SECTION 3 - HAZARDS IDENTIFICATION ******

EMERGENCY OVERVIEW

Appearance: Colorless, odorless liquid.
DANGER! Corrosive. Causes severe respiratory tract irrtitation with possible burns. Causes eye and skin burns. Harmful if swallowed. Causes corrosion of the digestive tract.
Appearance: Colorless (pure) to brown (impure), fuming liquid.
Target Organs: None.

Potential Health Effects

Eye:
Causes severe eye burns.
May cause irreversible eye injury.

Skin:
Causes skin burns.

Ingestion:
May cause severe and permanent damage to the digestive tract.
Causes gastrointestinal tract burns.

Inhalation:
Harmful if inhaled.
May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema.
May cause mucous membrane burns.

Chronic:

Prolonged or repeated inhalation may cause nosebleeds, nasal congestion, erosion of the teeth, perforation of the nasal septum, chest pain and bronchitis.

Prolonged or repeated eye contact may cause conjunctivitis.

**** SECTION 4 - FIRST AID MEASURES ****

Eyes:

Flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower lids.

Get medical aid immediately.

Skin:

Get medical aid immediately.

Flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes.

Speedy action is critical.

Ingestion:

Do NOT induce vomiting.

If victim is conscious and alert, give 2-4 cupfuls of milk or water.

Get medical aid immediately.

Inhalation:

Get medical aid immediately. Remove from exposure to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.

Notes to Physician:

Treat symptomatically and supportively.

None reported.

**** SECTION 5 - FIRE FIGHTING MEASURES ****

General Information:

Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products.

Contact with water can cause violent liberation of heat and splattering of the material.

Extinguishing Media:

Do not use water directly on fire.

Use water spray to cool fire-exposed containers.

Use dry chemical to fight fire.

Autoignition Temperature: Not available.

Flash Point: Not available.

Explosion Limits, Lower: Not available.
Upper: Not available.

**** SECTION 6 - ACCIDENTAL RELEASE MEASURES ****

General Information: Use proper personal protective equpiment as indicated in Section 8.

Spills/Leaks:

Clean up spills immediately, observing precautions in the Protective Equipment section. Cover with sand, dry lime or soda ash and place in a closed container for disposal.

**** SECTION 7 - HANDLING and STORAGE ****

Handling:

Wash thoroughly after handling.

Remove contaminated clothing and wash before reuse.

Do not get in eyes, on skin, or on clothing.

Keep container tightly closed.
Do not allow contact with water.
Use only in a chemical fume hood.

Storage:

Do not store near combustible materials.
Keep container closed when not in use.
Store in a dry area.
Store in a cool, dry, well-ventilated area away from incompatible substances.
Do not store near alkaline substances.

**** SECTION 8 - EXPOSURE CONTROLS, PERSONAL PROTECTION ****

Engineering Controls:

Use process enclosure, local exhaust ventilation, or other engineering controls to control airborne levels below recommended exposure limits.

Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Sulfuric acid	1 mg/m3; 3 mg/m3 STEL	1 mg/m3 TWA	1 mg/m3 TWA

OSHA Vacated PELs:

Sulfuric acid:
1 mg/m3 TWA

Personal Protective Equipment

Eyes:

Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133.

Skin:

Wear appropriate gloves to prevent skin exposure.

Clothing:

Wear appropriate protective clothing to minimize contact with skin.

Respirators:

Follow the OSHA respirator regulations found in 29CFR 1010.134. Always use a NIOSH-approved respirator when necessary.

**** SECTION 9 - PHYSICAL AND CHEMICAL PROPERTIES ****

Physical State:	Liquid
Appearance:	Colorless (pure) to brown (impure), fuming liquid.
Odor:	Odorless
pH:	0.3 (1N Solution)
Vapor Pressure:	< .00120 mm Hg
Vapor Density:	1.2 kg/m3
Evaporation Rate:	Slower than ether.
Viscosity:	Neglible
Boiling Point:	554.F
Freezing/Melting Point:	50.6.F
Decomposition Temperature:	340.C
Solubility:	Soluble in Water and Ethanol.
Specific Gravity/Density:	1.841

Molecular Formula: H2SO4
Molecular Weight: 98.0716

**** SECTION 10 - STABILITY AND REACTIVITY ****

Chemical Stability:
Stable under normal temperatures and pressures.
Conditions to Avoid:
Incompatible materials, contact with water, metals, excess heat, combustible materials, organic materials, oxidizers, amines, bases.
Incompatibilities with Other Materials:
Acetic Anhydride, Acetone Cyanhydrin, Acetone + Nitric Acid, Acetone + Potassium Dichromate, Acetonitrile, Acrolein, Acrylonitrile, Alcohols + Hydrogen Peroxide, Allyl Alcohol, Allyl Chloride, 2-Aminoethanol, Ammonium Hydroxide, Ammonium Triperchromate, Aniline, Bromates + Metals, Bromine Pentafluoride, n-Butyraldehyde, Carbides, Cesium Acetylene Carbide, Chlorates, Chlorine Trifluoride, Chlorosulfonic Acid, Cuprous Nitride, Diisobutylene, Epichlorohydrin, Ethylene Cyanohydrin, Ethylene Diamine, Ethylene Glycol, Ethylenimine, Fulminates, Other Acids, Iodine Heptafluoride, Metals, Isoprene, Lithium Silicide, Mercuric Nitride, Mesityl Oxide,
Hazardous Decomposition Products:
Oxides of sulfur.
Hazardous Polymerization: Has not been reported.

**** SECTION 11 - TOXICOLOGICAL INFORMATION ****

RTECS#:
CAS# 7664-93-9: WS5600000
LD50/LC50:
Inhalation, rat: LC50 = 510 mg/m3 2 hr Oral, rat: LD50 = 2140 mg/kg
Carcinogenicity:
Sulfuric acid
ACGIH: A2-suspected human carcinogen
California: carcinogen
NIOSH: occupational carcinogen
NTP: Suspect carcinogen
OSHA: Select carcinogen
IARC: Group 1 carcinogen
No components are listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology:
Workers exposed to industrial sulfuric acid mist showed a statistical increase in laryngeal cancer. This data suggests a possible relationship between carcinogenisis and inhalation of sulfuric acid mist.
Teratogenicity:
No data available.
Reproductive Effects:
No data available.
Neurotoxicity:
No data available.
Mutagenicity:
No data available.
Other Studies:
No data available.

**** SECTION 12 - ECOLOGICAL INFORMATION ****

Ecotoxicity:
Sulfuric acid is harmful to aquatic life in very low concentrations. It may be dangerous if it enters water intakes. The aquatic toxicity

for bluegill in fresh water was 24.5 ppm/24 hr, which was lethal.
Environmental Fate:
Not available.
Physical/Chemical:
Not available.
Physical/Chemical:
Not available.

**** SECTION 13 - DISPOSAL CONSIDERATIONS ****

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: Not listed.
RCRA D-Series Chronic Toxicity Reference Levels: Not listed.
RCRA F-Series: Not listed.
RCRA P-Series: Not listed.
RCRA U-Series: Not listed.
Not listed as a material banned from land disposal according to RCRA.

**** SECTION 14 - TRANSPORT INFORMATION ****

US DOT
Shipping Name: SULFURIC ACID
Hazard Class: 8
UN Number: UN1830
Packing Group: II
IMO
Shipping Name: SULPHURIC ACID, WITH MORE THAN 51% ACID
Hazard Class: 8
UN Number: 1830
Packing Group: 2
IATA
Shipping Name: SULPHURIC ACID
Hazard Class: 8
UN Number: 1830
Packing Group: 2
RID/ADR
Shipping Name: SULPHURIC ACID
Dangerous Goods Code: 8(1B)
UN Number: 1830
Canadian TDG
Shipping Name: SULFURIC ACID
Hazard Class: 8(9.2)
UN Number: UN1830

**** SECTION 15 - REGULATORY INFORMATION ****

A. Federal
TSCA
CAS# 7664-93-9 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA/SARA
Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)

CAS# 7664-93-9: TPQ = 1000 pounds

Section 313

Section 313:

This material contains Sulfuric acid (CAS# 7664-93-9, 95-98.0%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

This material does not contain any hazardous air pollutants.
This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 7664-93-9 is listed as a Hazardous Substance under the CWA.
None of the chemicals in this product are listed as Priority Pollutants under the CWA.
None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

B. State

Sulfuric acid can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.

California No Significant Risk Level:

None of the chemicals in this product are listed.

C. International

Canada

CAS# 7664-93-9 is listed on Canada's DSL/NDSL List.
CAS# 7664-93-9 is listed on Canada's Ingredient Disclosure List.

European Labeling in Accordance with EC Directives

Hazard Symbols: Not available.
Risk Phrases:
Safety Phrases:

**** SECTION 16 - ADDITIONAL INFORMATION ****

Additional Information:

No additional information available.

MSDS Creation Date: December 28, 1994

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes.

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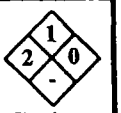
Section 1. Material Identification

Potassium Iodide Description: Commercially prepared by hydrogen iodide (HI) and potassium bicarbonate ($KHCO_3$). Used to manufacture photographic emulsions; in the treatment of radiation poisoning from nuclear accidents; found in table salt as a source of iodine and in some drinking water; in analytical chemistry; and in animal and poultry feeds at concentrations of 10 to 30 ppm.

Other Designations: Knollide; potide; KI; CAS No. 7681-11-0.

Manufacturer: Contact your supplier or distributor. Consult the latest *Chemicalweek Buyers' Guide* (Genium ref. 73) for a suppliers list.

R	1
I	-
S	2
K	0



Genium HMIS
H 2
F 1
R 0
PPG*
* Sec. 8

Section 2. Ingredients and Occupational Exposure Limits

Potassium iodide, ca 100%

OSHA PEL	ACGIH TLV, 1988-89	NIOSH REL	Toxicity Data*
None established	None established	None established	Mouse, oral, LD_{Lo}:1862 mg/kg Rat, intravenous, LD_{Lo}: 120 mg/kg

* See NIOSH, *RTECS* (TT2975000), for additional data with references to reproductive and mutagenic effects.

Section 3. Physical Data

pH: 7 to 9

Molecular Weight: 166 g/mol

Melting Point: 1256 °F (680 °C)

Specific Gravity (H_2O = 1): 3.12

Appearance and Odor: Colorless or white, cubical crystals, white granules or powder. Dry potassium iodide is slightly deliquescent in moist air; prolonged air exposure causes the potassium iodide to become yellow because of the liberation of iodine. Light and moisture accelerate this decomposition.

Section 4. Fire and Explosion Data

Flash Point: *	Autoignition Temperature: *	LEL: *	UEL: *

Extinguishing Media: * Potassium iodide does not burn. Use extinguishing agents such as carbon dioxide (CO_2), dry chemical, water spray, or foams to put out the surrounding fire.

Unusual Fire or Explosion Hazards: None reported.

Special Fire-fighting Procedures: Wear a self-contained breathing apparatus (SCBA) with a full facepiece operated in the pressure-demand or positive-pressure mode.

Section 5. Reactivity Data

Stability/Polymerization: Potassium iodide is stable at room temperature during routine operations. Hazardous polymerization cannot occur.

Chemical Incompatibilities: Potassium iodide is incompatible with salts of alkaloids, chloral hydrate, calomel (mercurous chloride), potassium chlorate, metallic salts, tartaric and other acids, bromine trifluoride, chlorine trifluoride, and fluorine perchlorate.

Conditions to Avoid: Prevent direct contact between potassium iodide and the incompatible chemicals listed above. Avoid prolonged exposure to air, light, and moisture since this can lead to gradual decompostion problems.

Hazardous Products of Decomposition: Thermal oxidative degradation of potassium iodide can produce oxides of potassium (KO_x) and iodine compounds.

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Section 6. Health Hazard Data

Carcinogenicity: Neither the NTP, IARC, nor OSHA lists potassium iodide as a carcinogen. **Attention:** Since iodine salts can cause significant deformity, illness, and death to a fetus, counsel and appropriately protect pregnant employees.
Summary of Risks: Potassium iodide can cause irritation of the skin, eyes, and mucous membranes lining the respiratory tract depending upon the exposure's intensity and duration. Systemic poisoning does not appear to be associated with occupational exposure to potassium iodide. Animal experiments indicate that potassium iodide is highly toxic via intravenous administration and moderately toxic via oral and intraperitoneal routes of administration. These routes of exposure are inapplicable, however, to routine occupational exposures.
Medical Conditions Aggravated by Long-Term Exposure: None reported.
Target Organs: Skin, eyes, and mucous membranes.
Primary Entry: Inhalation, skin contact.
Acute Effects: Minimal irritation of the skin, eyes, and mucous membranes.
Chronic Effects: May cause "iodism," a mild toxicity characterized by salivation, runny eyes and nose, laringytis, bronchitis, irritation of the mouth, enlargement of the salivary glands, skin rashes, and a swelling of the epiglatto to the point of requiring a tracheotomy.
FIRST AID
Eyes: Flush immediately, including under the eyelids, gently but thoroughly with flooding amounts of running water for at least 15 min.
Skin: After rinsing affected area with flooding amounts of water, wash it with soap and water.
Inhalation: Remove the exposed person to fresh air and support breathing as needed. Have qualified medical personnel administer oxygen as required.
Ingestion: Unlikely. If ingested, have the exposed person drink 1 to 2 glasses of water. Consider induction of vomiting in alert, conscious individuals.
After first aid, get appropriate in-plant, paramedic, or community medical attention and support.

Section 7. Spill, Leak, and Disposal Procedures

Spill/Leak: When a spill occurs, notify safety personnel and provide adequate ventilation. Cleanup personnel should wear personal protective equipment (Sec. 8) to prevent prolonged or repeated skin contact and dust/powder inhalation. Do not create dusty conditions during cleanup operations. Shovel, scoop, or vacuum the spilled material into appropriate disposal or recovery containers.
Disposal: Contact your supplier or a licensed contractor for detailed recommendations. Follow applicable Federal, state, and local regulations.
OSHA Designations
Air Contaminant (29 CFR 1910.1000, Subpart Z): Not listed
EPA Designations
RCRA Hazardous Waste (40 CFR 261.33): Not listed
CERCLA Hazardous Substance (40 CFR 302.4): Not listed
SARA Extremely Hazardous Substance (40 CFR 355): Not listed
SARA Toxic Chemical (40 CFR 372.65): Not listed

Section 8. Special Protection Data

Goggles: Wear protective eyeglasses or chemical safety goggles, per OSHA eye- and face-protection regulations (29 CFR 1910.133).
Respirator: Wear a NIOSH-approved respirator if necessary. Follow OSHA respirator regulations (29 CFR 1910.134). For emergency or nonroutine operations (spills or cleaning reactor vessels and storage tanks), wear an SCBA.
Warning: Air-purifying respirators do *not* protect workers in oxygen-deficient atmospheres.
Other: Wear impervious gloves, boots, aprons, and gauntlets to prevent prolonged or repeated skin contact.
Ventilation: Provide general and local ventilation systems tomaintain airborne concentrations that protect worker safety and productivity. Local exhaust ventilation is preferred since it prevents contaminant dispersion into the work area by eliminating it at its source (Genium ref. 103).
Safety Stations: Make available in the work area emergency eyewash stations, safety/quick-drench showers, and washing facilities.
Contaminated Equipment: Never wear contact lenses in the work area: soft lenses may absorb, and all lenses concentrate, irritants. Launder contaminated clothing before wearing. Remove this material from your shoes and equipment.
Comments: Never eat, drink, or smoke in work areas. Practice good personal hygiene after using this material, especially before eating, drinking, smoking, using the toilet, or applying cosmetics.

Section 9. Special Precautions and Comments

Storage Requirements: Store potassium iodide in closed containers in a cool, dry, well-ventilated area away from incompatible chemicals (Sec. 5). Protect these containers from physical damage.
Special Handling/Storage: Prolonged storage is not recommended because of possible degradation problems, including yellowing of the potassium iodide product. Always inspect the potassium iodide's color and overall quality before removing bulk quantities for operations in production areas.

Transportation Data (49 CFR 172.101-2): Not listed

MSDS Collection References: 1, 6, 7, 84-94, 100, 116, 117, 119, 120, 122
Prepared by: PJ Igoe, BS; **Industrial Hygiene Review:** DJ Wilson, CIH; **Medical Review:** W Silverman, MD
F4

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ATTACHMENT M

CONFINED SPACES

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Confined Space**	**Document No.**	**10**
Date of Issue:	**November 1999**	**Revision No.**	**2** **Page 1 of 14**
Approval		**Approval**	

PERMIT-REQUIRED CONFINED SPACE PROGRAM

This program establishes confined space procedures for the employees of Environmental Quality Management, Inc. (EQ). The program is intended to control and protect employees from confined space hazards and to regulate employee entry into confined spaces. Only personnel trained in, and knowledgeable of, the requirements of this Permit-Required Confined Space Program (Permit Space Program) will be authorized to participate in confined space entries or provide onsite support to authorized entry personnel.

This Permit Space Program has been developed for compliance with OSHA Standard 29 CFR 1910.146, *Permit-required Confined Spaces*. It contains specific procedures to:

- Identify confined spaces at a project location.
- Evaluate the hazardous characteristics of the confined space.
- Prepare for entry.
- Allow EQ employees to enter and work in the space.

1.0 CONFINED SPACE DETERMINATIONS

A *confined space* is a space or work area large enough for personnel to enter but having limited means of entry or egress. It is not designed or intended for continuous human occupancy.

The project manager or other EQ employee designated as the *entry supervisor* will determine if the workplace is a *permit-required confined space* (permit space), i.e., a confined space having one or more of the following actual or potential hazardous characteristics:

- Contains a hazardous atmosphere

- Contains a material that has the potential for engulfing an entrant
- Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section
- Contains any other recognized serious safety or health hazard.

The nature of project tasks will be considered, and if it is determined that work can be completed without having to enter the permit space, barricades will be set up to prevent entry by EQ personnel, subcontractors, or other individuals.

When entry into the space is intended, the entry supervisor will evaluate the hazards of the confined space and determine if an *entry permit* needs to be issued before *authorized entrants* will be allowed to enter and work within the space. If subcontractors will enter the space with EQ personnel, the entry supervisor will make them aware of the nature of the permit space and the existence of this Permit Space Program and will coordinate operations.

No permit is required when the confined space 1) does not have permit space hazards or potentials (*non-permit confined space*), or 2) mechanical ventilation alone can eliminate all hazards prior to and during entry. Specific requirements for entries into confined spaces meeting the second criterion alone are included in the Permit Procedures subsection.

2.0 HAZARD EVALUATION

2.1 Entrapment/Engulfment

The entry supervisor will discuss the history and use of the confined space with the client or other persons having knowledge of the space. The potential for entrapment or engulfment will be considered, and the need to isolate the space by lockout and tagout procedures will be evaluated.

For sewer entries, it may not be possible to achieve complete engulfment protection through isolation. In this case, the entry supervisor will notify and, when possible, coordinate entries with industries and municipalities that may otherwise inadvertently create an unannounced engulfment hazard by discharging into the sewer system. Current weather forecasts will be considered in evaluating the potential for sudden discharge of stormwater runoff to the system during entries. When precipitation is imminent, radio broadcasts by the National Weather Service will be monitored.

2.2 Hazardous Atmospheres

Prior to entry operations, the entry supervisor will monitor for hazardous atmospheres to assess the space for acceptable entry conditions. Instrumentation will be approved as inherently safe for use in Class I, Division 1, atmospheres and include audio alarms preset to sound when readings vary beyond the ranges of predetermined acceptable entry conditions for the parameters being monitored. The devices will be operated, calibrated, and maintained by personnel trained in accordance with manufacturer's instructions. A current log of calibration and maintenance will be kept at the job site or the EQ corporate office.

Measurements within the space will be compared to predetermined background (ambient) conditions. Readings will be made remotely when practicable and will be taken at the entrance to the space and at varying locations and depths within the space as appropriate to the nature of the anticipated atmospheric hazards and the configuration of the space. Sewers typically will be monitored at 1- to 2-foot intervals beginning at the manhole and continuing across the depth of the space. The following atmospheric conditions will be assessed, as described, in the order presented:

- *Oxygen concentration* will be determined using an oxygen meter or a combination monitoring device that includes this function. Readings between 19.5 and 23.5 percent are considered acceptable for entry.

- *Explosive atmospheres* will be measured using a device capable of assessing the concentrations relative to the lower explosive limit (LEL). Readings at or above 10 percent of the LEL are regarded as prohibited conditions. Detectable concentrations <10 percent of the LEL are considered acceptable for permitted entry.

- *Toxic atmospheres* will be assessed using gross survey meters such as a photoionization detector (PID) or a flame ionization detector (FID). Acceptable entry conditions will be determined relative to the Permissible Exposure Limit (PEL) or other available exposure guideline for known chemical and physical airborne contaminants. For sewer entry, compound-specific monitors ("monotox units," compound-specific functions of multimeters, or colorimetric indicator tubes) for carbon monoxide, hydrogen sulfide, or other known contaminants will be included in the evaluation of toxic atmospheres.

Based upon the results of the hazard assessment of the confined space, the entry supervisor will determine if the confined space presents no hazards and can be classified as a non-permit confined space, the atmospheric hazards can be managed with mechanical ventilation alone, or the hazards cannot be eliminated prior to entry. In the latter case, a permit must be issued and all its conditions must be met before entry will be authorized.

3.0 PREPARATION FOR ENTRY

The entry supervisor will determine specific *acceptable entry conditions* prior to allowing entry operations to begin. As necessary, measures will be taken, then conditions verified, before issuance of an entry permit. At a minimum, the following conditions will be satisfied.

3.1 Isolation

All forms of known or potential energy input to the permit space will be assessed. To the extent practicable, water, product or waste, electrical, and other lines will be disconnected, blanked, locked out, or tagged out. These procedures will be conducted with interaction from the client and local utility companies in accordance with OSHA Standard 29 CFR 1910.147 *The Control of Hazardous Energy (Lockout/Tagout).*

3.2 Space Ventilation

Natural ventilation shall be provided for the permit space prior to initial entry and for the duration of the permit. Prior to sewer or other confined space entry, manhole covers or lids will be removed from all available ports accessing the space, including the point of ingress, at least 1/2 hour prior to planned entry operations. Positive pressure or forced mechanical ventilation may be required to achieve 100 percent outside air. Atmospheres in the space will be retested to verify ventilation effectiveness.

Where air-moving equipment is used to provide ventilation, chemicals shall be removed from the vicinity to prevent their introduction into the permit space. The source of intake air will be monitored. Vehicles shall not be left running near permit space work or near air-moving equipment being used for permit space ventilation.

During entry operations, output air from mechanical ventilation shall be directed on the authorized entrants whenever practicable.

3.3 Lighting

Lighting requirements will be determined based upon the configuration of the confined space and the nature of entry operations. Flashlights and temporary light fixtures will be inventoried and used to provide entrants sufficient illumination for a safe workplace and visible exit pathways. Hand-held lights and other illumination utilized in confined space shall be equipped with guards to prevent contact with the bulk and must be explosion-proof. For use in sewer entries, flashlights must also be water-tight.

3.4 Communication

Authorized entrants must be able to communicate directly with the attendant outside the space. Visual and verbal communication is preferred. As needed, inherently safe radios may be used to enable the attendant to monitor entrant activities and notify them to exit in the event of an emergency. When possible, the attendant will maintain visual contact with at least one other person outside the permit space who may be called for assistance in the event of an emergency.

3.5 Barricades

The entrance to the space will be marked and access limited to prevent unauthorized entries into the space. Barricade tape, traffic cones, or construction fencing will be used to keep client and subcontractor personnel or other individuals from injury or posing external risk to authorized entrants.

3.6 Posting

Permit spaces shall be identified with a posted sign which reads, "DANGER - PERMIT-REQUIRED CONFINED SPACE, DO NOT ENTER."

The authorized permit shall be issued and posted at the work site. The permit shall be removed at the completion of the job or the end of the shift, whichever comes first. The date and time of cancellation shall be recorded on the original permit. The form will be filed by the entry supervisor at the job site and, at the conclusion of the project, kept in the corporate office files.

3.7 Fire Extinguisher/First Aid Kit

An emergency station will be set up outside the entrance to provide a fire extinguisher, first aid kit, and other job-specific supplies that the attendant can make available to the entrants on an as-needed basis.

3.8 Emergency Plan

An emergency plan must be established and reviewed by project personnel prior to entry. The plan will detail the nature of potential emergency situations that may arise and identify emergency response personnel, equipment, services, and procedures.

3.9 Pre-Entry Briefing

The entry supervisor will hold a briefing prior to authorizing entry for all personnel involved in entry or support. The meeting will cover the contents and conditions of the permit, including planned operations, safety considerations, and emergency preparedness.

3.10 Safety Equipment

3.10.1 Personal Protective Equipment (PPE)

Selection and use of PPE will be based upon the understanding of risk associated with the confined space and its measured and estimated hazards. Assigned PPE will be inventoried to assure adequate quantities are available and inspected for integrity and proper function.

Only MSHA/NIOSH-approved positive-pressure self-contained breathing apparatus (SCBA) or airline respirators equipped with a 5-minute emergency air supply (egress bottle) shall be used in hazardous atmospheres or in any permit space with conditions determined to be, or which could potentially be, immediately dangerous to life and health (IDLH). Air-purifying respirators (APR) may be used when actual and potential conditions in the permit space can be determined or anticipated to satisfy APR selection criteria as specified in OSHA's *Respiratory Protection* Standard, 29 CFR 1910.134.

3.10.2 Confined Space Equipment

At a minimum, a lifeline must be attached to the entrant before he/she is allowed to enter a permit space. Provisions must be

made (e.g., tripod and pulley assembly provided) so the attendant can initiate a rescue from outside the space if problems occur. It is recommended that a safety harness and wristlets be added if an overhead entry is made.

Hand tools used in confined spaces shall be in good repair, explosion-proof, and selected according to intended use. Where possible, pneumatic power tools are to be used.

Compressed gas cylinders (except cylinders used for SCBAs) shall not be taken into confined spaces. Gas hoses shall be removed from the space and the supply turned off at the cylinder valve when personnel exit from the confined space.

A ladder is required in all confined spaces deeper than the employee's shoulders or 4 feet, whichever is less. The ladder shall be secured and not removed until all employees have exited the space.

If a trench is 4 feet or deeper, it is considered a confined space, and these procedures must be followed. Sloping or benching may be substituted for a ladder. Additionally, the provisions of the OSHA Standard 29 CFR 1926.650 on excavation must be followed regarding soil types, trench shields, sloping, water removal, shoring, benching, etc.

3.11 Rescue and Emergency Services

The attendant will be prepared to use the entrant's rescue equipment without entering the space. The attendant will not enter the space to attempt a rescue without first being relieved by another trained attendant. If an offsite rescue service is to be used, the attendant must be prepared to summon the service as directed in the emergency plan. A nearby or mobile telephone must be identified that offers access for this need.

Rescue and emergency service personnel must be properly equipped with appropriate PPE. They must have received specific training on proper confined spaces rescue procedures and performed a simulated rescue during their training. The rescue team must practice a rescue at least every 12 months in which a mannequin or person is actually rescued from a confined space. One member of the rescue team must hold a current certificate in basic first aid and CPR.

If an outside rescue team is used, they will be apprised of all known hazards before a rescue attempt is made.

3.12 Contractor Notification

The entry supervisor will notify any subcontractors involved in entry operations of the conditions of the entry permit and summarize existing information regarding the specific hazards of the confined space. If entries are planned with subcontractor personnel, the entry supervisor will coordinate activities within the space during the project.

4.0 PERMIT PROCEDURES

4.1 Entry Without Permit/Attendant

All confined spaces will be considered to be permit spaces unless the results of the entry supervisor's hazard evaluation and pre-entry preparations indicate the absence of real or potential hazards or that ventilation alone can effectively mitigate all space hazards. If atmospheric hazards are the sole risk and retesting demonstrates that they have been eliminated after 30 minutes of forced air ventilation, entry may be allowed without permit issuance or the use of an attendant. The permit form or other means of clear documentation will be used as a checklist to record that these conditions are true. Pre-entry requirements to assure acceptable conditions with regard to confined space hazards described previously must be satisfied and documented.

The entry supervisor will periodically retest the atmosphere in the permit space to verify that the hazards do not recur during entry operations.

4.2 Permitted Entry

The entry supervisor must evaluate workplace hazards and verify the fulfillment of pre-entry preparations before authorizing entry into the permit space. The permit is valid for up to one 8-hour shift and authorized entry is only for those EQ personnel identified on the permit who have also met the confined space entry training and pre-entry briefing requirements.

During entry operations, the attendant will keep a current listing of authorized entrants working within the permit space.

Should planned entry operations be interrupted or should a confined space hazard develop or recur, all entrants must promptly exit the permit space. The entry supervisor must reassess and, if appropriate, issue a new entry permit before authorizing the resumption of entry operations.

At the completion of entry operations, the entry supervisor will terminate the permit and file it in project records at the job site or the EQ corporate office.

ENVIRONMENTAL QUALITY MANAGEMENT, INC.
CONFINED SPACE ENTRY PROCEDURES

1.0 PURPOSE

To establish requirements for safe entry into, continued work in, and safe exit from confined spaces.

2.0 DEFINITIONS

Confined Space: A space or work area not designed or intended for normal human occupancy, having limited means of egress and poor natural ventilation, and/or any structure, including buildings or rooms, which has limited means of egress.

Confined Space Entry Permit: A document to be initiated by the supervisor of personnel who are to enter into or work in a confined space. The Confined Space Entry Permit (CSEP) will be completed by the Response Manager or supervisor before personnel will be permitted to enter the confined space. The CSEP shall be valid only for the performance of the work identified and for the location and time specified. The beginning of a new shift with change of personnel will require the issuance of a new CSEP. A copy of the CSEP is attached for reference purposes.

Confined Space Observer: An individual assigned to monitor the activities of personnel working within a confined space. The confined space observer monitors and provides external assistance to those inside the confined space. The confined space observer summons rescue personnel in the event of an emergency and assists the rescue team.

3.0 GENERAL

- The Project Manager has the responsibility to issue the CSEP, to evaluate and monitor work performed within a confined space for possible hazards, and to determine the safety procedures, PPE, and rescue equipment required.

- When possible, confined spaces should be identified with a posted sign which reads "Caution - Confined Space." Only personnel trained and knowledgeable of the requirements of these CSEPs will be authorized to enter a confined space or be a confined space observer. A CSEP must

be issued prior to the performance of any work within a confined space. The CSEP will become a part of the permanent and official record of the site.

- Natural ventilation shall be provided for the confined space prior to initial entry and for the duration of the CSEP. Positive/forced mechanical ventilation may be required. However, care should be taken to not spread contamination outside of the enclosed area.

- If flammable liquids may be contained within the confined space, explosion-proof equipment will be used. All equipment shall be positively grounded. The contents of any confined space shall, where necessary, be removed prior to entry. All sources of ignition must be removed prior to entry.

- Hand tools used in confined spaces shall be in good repair, explosion-proof, and spark-proof, and selected according to intended use. Where possible, pneumatic power tools are to be used. Hand-held lights and other illumination utilized in confined spaces shall be equipped with guards to prevent contact with the bulb and must be explosion-proof.

- Compressed gas cylinders, except cylinders used for self-contained breathing apparatus, shall not be taken into confined spaces. Gas hoses shall be removed from the space and the supply turned off at the cylinder valve when personnel exit from the confined space.

- A ladder is required in all confined spaces deeper than the employee's shoulders. The ladder shall be secured and not removed until all employees have exited the space.

- Only self-contained breathing apparatus or NIOSH approved airline respirators equipped with a 5-minute emergency air supply (egress bottle) shall be used in untested confined spaces or in any confined space with conditions determined immediately dangerous to life and health. Where air-moving equipment is to be used to provide ventilation, chemicals shall be removed from the vicinity to prevent introduction into the confined space.

- Vehicles shall not be left running near confined space work or near air-moving equipment being used for confined space ventilation. In addition, smoking in confined spaces will be prohibited at all times. Any deviation from these Confined Space Entry Procedures requires the prior permission of the Project Manager.

4.0 PROCEDURE FOR CONFINED SPACE ENTRY PERMITS (CSEP)

The Project Manager shall:

- Evaluate the job to be done and identify the potential hazards before a job in a confined space is scheduled.
- Ensure that all process piping, mechanical and electrical equipment, etc., have been disconnected, purged, blanked-off, or locked and tagged as necessary.
- If possible, ensure removal of any standing fluids that may produce toxic or air displacing gases, vapors, or dust.
- Initiate a CSEP in concurrence with the SSO.
- Ensure that any hot work (welding, burning, open flames, or spark producing operation) that is to be performed in the confined space has been approved and is indicated on the CSEP.
- Ensure that the space is ventilated before starting work in the confined space and for the duration of the time that the work is to be performed in the space.
- Ensure that the personnel who enter the confined space and the confined observer helper are familiar with the contents and requirements of this instruction.
- Ensure remote atmospheric testing of the confined space prior to employee entry and before validation/revalidation of a CSEP to ensure the following:
  - Oxygen content between 19.5% - 23.0%.
  - No concentration of combustible gas in the space. Sampling will be done throughout the confined space and specifically at the lowest point in the space.
  - The absence of other atmospheric contaminants if the space has contained toxic, corrosive, or irritant material.
  - If remote testing is not possible, a minimum of Level B PPE is required.
- Designate whether hot or cold work will be allowed.

- Ensure that a copy of the CSEP is posted at the work site, a copy is filed with the project supervisor, and a copy is furnished to the SSO.

The CSEP posted at the work site shall be removed at the completion of the job or the end of the shift, whichever is first. The date and time shall be recorded on the form and the form filed with the Project Manager at the command post.

5.0 CONFINED SPACE OBSERVER

- While personnel are inside the confined space, a confined space observer will monitor the activities and provide external assistance to those in the space. The observer will have no other duties which may take his attention away from the work or require him to leave the vicinity of the confined space at any time while personnel are in the space.

- The confined space observer shall maintain at least voice contact with all personnel in the confined space. Visual contact is preferred, if possible. The observer shall be instructed by his supervisor in the method for contacting rescue personnel in the event of an emergency. If irregularities within the space are detected by the observer, personnel within the space will be ordered to exit.

- In the event of an emergency, the observer must NEVER enter the confined space prior to contacting and receiving assistance from a helper. Prior to this time, he should attempt to remove personnel with the lifeline and to perform all other rescue functions from outside the space.

- A helper shall be designated to provide assistance to the confined space observer in case the observer must enter the confined space to retrieve personnel.

ATTACHMENT N

ELECTRICAL SAFETY

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Electrical Safety**	**Document No.**	**18**
Date of Issue:	**November 1999**	**Revision No.**	**2**
Approval		**Approval**	

1.0 OBJECTIVE

Environmental Quality Management, Inc. (EQ) personnel performing work on electrical systems and equipment will follow standards set by the National Electrical Code (NEC) and OSHA in selection of materials and methods of installation and maintenance. Only qualified personnel will work on electrical systems and equipment

2.0 PURPOSE

This procedure specifies the requirements for electrical equipment and methods and is an overview of the requirements of 29 CFR 1910, Subpart S-Electrical. If work is to be performed on any electrical circuit, lockout/tagout may be required. Refer to the Lockout/Tagout procedure.

3.0 GENERAL REQUIREMENTS

No electrical work should be done on an energized circuit. Only approved electricians will be permitted to work on electrical equipment or permanent electrical wiring. Proper clearance and grounding procedures must be used. All electrical circuits and equipment shall be de-energized and lockout/tagout accomplished before maintenance or repair work is started.

Single-phase electric hand tools and other single-phase portable electrical equipment must be approved by a recognized testing agency. All exposed non-current-carrying metal parts must be grounded, or be double insulated.

Before each use, portable electrical appliances are to be examined for obvious deficiencies in the appliance, cord, and plug. If any deficiency is noted, the appliance is not to be used.

Extension cords are to be kept clean, dry, free of kinks, and protected from oil, hot or sharp surfaces, and chemicals. Extension cords used outdoors shall be Ground Fault Circuit Interrupter (GFCI) protected. All extension cords shall be free from damage and are not to be placed across aisles, through doors, through holes in the wall, or in areas where the cord may be damaged or become a tripping hazard. Extension cords must not be placed in walkways, or on stairs or steps where the cords may pose a tripping hazard.

4.0 PORTABLE ELECTRICAL EQUIPMENT

Double insulated portable industrial type electric tools meeting the requirements of the Underwriters Laboratory are authorized for use (ground wire not required). Where such a system is employed, the equipment must be distinctly marked.

Portable electrical tools not provided with special insulating or grounding protection are not intended for use in damp, wet, or conductive locations (persons standing on the ground or on metal floors).

All portable electrical appliances and equipment where the non-current carrying metal parts are exposed to contact by personnel shall be grounded by a continuous conductor of adequate capacity from the device to a grounded receptacle. The site safety officer shall resolve any question which arises as to whether or not a particular appliance should be grounded.

Grounding of receptacles shall be accomplished in one of two ways:

- A built-in ground wire of green color may be attached to the ground pole of the receptacle.

- The conduit system, if installed in an approved manner, may be relied upon for grounding of a receptacle serving single-phase appliances with ratings up to 230 volts.

At outside locations, all single-phase 15- and 20-ampere receptacle outlets operating at 230 volts or less which are not a part of the permanent wiring of the building or structure must have GFCI for personnel protection. The GFCI should be located at the power source so that all extension cords and tools are protected by the GFCI.

The outlet box for portable extension cords for outdoor use shall be of weatherproof type maintained in good condition.

5.0 ELECTRICAL GUARDING

Suitable access and working space shall be provided and maintained in the vicinity of all electric equipment to permit ready and safe operation and maintenance of such equipment.

The dimension of the working space in the direction of access to energized parts in switchboards, control panels, fused switches, circuit breakers, panel boards, motor controllers, and similar equipment which require examination, adjustment, servicing, or maintenance while energized, shall not be less than 36" deep (30" for installations built prior to 1981) and the side being 30" or the width of the equipment, whichever is greater.

The working space shall not be used for storage purposes. The "keep clear" area may be identified with suitable floor markings and/or posting of signs or decals on the equipment

Energized parts of electrical equipment operating at 50 volts or more shall be guarded against accidental contact by the use of approved cabinets or enclosures.

Entrance to rooms and other guarded locations containing exposed energized parts shall be marked with a conspicuous warning sign forbidding unqualified persons to enter.

Temporary covers, warning signs, and/or barricades are to be used when it is necessary to remove covers of electrical panels during construction, major refurbishment, or for the purpose of providing temporary power to an area.

All openings in boxes, enclosures, or fittings shall be effectively guarded or closed to afford protection substantially equivalent to that of the wall of the box, enclosure, or fitting.

All electrical components over 230 volts shall have signs stating "High Voltage" 240 volts.

6.0 EXTENSION CORD REQUIREMENTS

Extension cords are designed for and will be used for TEMPORARY USE ONLY! All other electrical connections will be made permanent by proper construction methods. Use of indoor extension cords greater than 50 feet in length is to be discouraged. All extension cords shall include a grounding conductor within the cable jacket and shall be equipped at each end with either explosion-proof or non-explosion-proof three-wire grounded receptacles and plugs (but not with

one of each), depending on the location and intended use. (No "hybrid" ungrounded or external ground wire extension cords are allowed.)

If a cord is damaged, it shall be shortened or replaced by an electrician - never patched with electrical tape. Cords shall be protected against contact with oil, hot surfaces, and chemicals. Cords must not be hung over nails or other sharp edges or placed where vehicles may run over them.

7.0 ELECTRICAL FUSE REQUIREMENTS

Circuits must be de-energized by lockout and tagout procedures before attempting to replace fuses. Bridging of fuses or circumventing the normal operation of circuit breakers is prohibited. Blown fuses shall not be replaced with fuses having a higher amperage or voltage rating. Fuses should be replaced in kind to maintain proper circuit protection. A fuse puller should be used to remove fuses.

8.0 ASSURED ELECTRICAL GROUNDING REQUIREMENTS

This program provides the minimum requirements for an assured equipment grounding conductor program and reflects the requirements of 29 CFR 1910.304. It also applies to circuits and equipment not attached to a permanent building or structure.

EQ and its contractors will implement either a written assured equipment grounding conductor program or use GFCI's when using temporary wiring (cords and plugs) in field work using any temporary electrical power source.

Cords and equipment will be inspected prior to each use for damage or missing parts. Equipment which is found to be defective will be taken out of service and repaired.

The Assured Equipment Grounding Conductor Program will include the following:

- The written program.
- Designation of a competent person(s) to implement the program.
- Visual inspection of cords on a daily basis for deformed and missing pins, insulation damage, and indications of possible internal damage. Equipment found damaged or defective will be removed from service and repaired or expended.

- Cords and electrical circuits will be tested for the following:
  - Electrical grounding continuity
  - Correct attachment of grounding conductor
- Tests outlined above shall be performed before the first use, before being returned to use after repair, after possible damage (such as being run over by a vehicle), and at least every three months.
- The tests outlined above must be recorded, and cords which have been tested identified.

ATTACHMENT O

WORK FROM ELEVATED SURFACES

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Work from Elevated Surfaces**	**Document No.**	**78**
Date of Issue:	**November 1999**	**Revision No.**	**1** **Page 1 of 6**
Approval		**Approval**	

SCAFFOLDING

1.0 PURPOSE

The purpose of this SOP is to set forth minimum safety requirements and guidance for personnel who supervise or perform work on or around scaffolding.

2.0 REFERENCES

- 29 CFR 1910 Subpart D
- 29 CFR 1926 Subpart L
- Title 8 CAC Article 21
- Title 8 CAC Article 23
- Scaffold Industry Association Code of Safe Practices

3.0 DISCUSSION

Use of scaffolding can increase the potential for injury in several ways. Improper erection or dismantling of scaffolding can result in complete or partial collapse of the scaffold, as can exceeding the maximum rated load of the design. Workers on scaffolds must take particular care when ascending or descending scaffolds and when raising or lowering equipment and material on scaffolds.

This procedure provides basic, general guidance to employees working on or around scaffolds. In addition, all manufacturer's and supplier's recommendations shall be observed.

4.0 DEFINITIONS

Access (Climbing) Ladder - A separate ladder with equally-spaced rungs usually attached to the scaffold structure for climbing and descending.

Brace - A tie that holds one scaffold member in a fixed position with respect to another member.

Couple - A device for locking together the component parts of a tubular metal scaffold.

Guardrail - A rail secured to uprights and erected along with exposed sides and ends of platforms, approximately 42 inches high, with a midrail when required.

Manually Propelled (Mobile) Scaffold - A portable rolling scaffold mounted on casters.

Maximum Rated Load - The total of all loads including the load imposed by men, equipment, and materials; the weight of the scaffold; and other such loads as may be reasonably anticipated.

Scaffold - Any temporary elevated platform and its supporting structure used for supporting workmen or materials or both.

Toeboard - A barrier, at least 4 inches high, secured along with the sides and ends of a platform to guard against the falling of material.

Tube and Coupler Scaffold - An assembly consisting of tubing which serves as posts, bearers, braces, ties, and runners; a base supporting the ports; and special couplers which serve to connect the uprights and to join the various members.

Tubular Welded Frame Scaffold - A sectional panel or frame metal scaffold built of prefabricated welded sections which consist of posts and horizontal bearers with intermediate members.

5.0 PROCEDURE

- Scaffolds shall be provided for all work that cannot be done safely by employees standing on permanent or solid construction, except where such work can be safely done from ladders.

- Scaffolds shall only be erected, moved, dismantled, or altered under the supervision of persons qualified by any combination of training and experience.
- A survey shall be made of the jobsite for hazards such as debris, unguarded floor or wall openings, and energized electrical equipment.
- All scaffolding components shall be inspected prior to use.
- The footing or anchorage for scaffolds shall be sound, rigid, and capable of carrying the maximum intended load without settling or displacement.
- Unstable objects such as drums, boxes, loose brick, or block shall not be used to support scaffolds or work platforms.
- Scaffolds shall be adequately anchored or braced to prevent swaying, tipping, or collapsing. When the height of a free-standing or rolling scaffold exceeds three times the minimum base dimensions, the scaffold must be securely guyed or tied.
- Scaffolds and their components shall be capable of supporting four times the maximum intended load without failure.
- Any damaged or defective scaffold component shall be immediately repaired or replaced upon discovery.
- Erected scaffolds shall be continuously inspected during use.
- Guardrails and toeboards shall be installed on all open sides and ends of platforms more than 7 1/2 feet above the ground or floor.
- Rolling scaffold shall not be moved while occupied, and all material and equipment shall be removed or secured prior to moving the scaffold.
- Wheels or casters on rolling scaffolds shall be provided with a locking mechanism and shall be kept locked except when being moved.
- Materials being hoisted onto a scaffold shall have a tag line.
- Screen, consisting of 1/2-inch wire mesh or equivalent, shall be provided between the toeboard and guardrail, extending along the entire opening where persons are required to work or pass under the scaffold.
- Employees shall not work on exterior scaffolds during storms or high winds.

- No workers shall be permitted to work on a scaffold where slippery conditions exist, unless such conditions are a necessary part of the job.

- Tools, materials, and debris shall not be allowed to accumulate in quantities to cause a hazard.

- All scaffolding components shall be installed and used according to the manufacturer's and supplier's recommended procedure. Components shall not be altered in the field.

6.0 SAFE WORK PRACTICES

- Do not work on scaffolds if you feel dizzy or unstable in any way.

- Do not use ladders or other devices on top of scaffolds to increase the height.

- Move slowly when entering or leaving a work platform.

- Do not jump onto work platforms or planks.

- Climb only on ladders or designated access areas.

- Use both hands when climbing or descending.

- Do not throw anything from scaffolds.

- Do not ride a scaffold while it is being moved.

- Do not move a scaffold without sufficient help. Watch out for floor holes and overhead obstructions.

- Report any damaged or defective scaffolding components immediately. Do not use until repaired or replaced.

7.0 NOTIFICATION

The project manager shall notify the local Health and Safety office of the planned use of scaffolding using Attachment A - Scaffolding Notification Worksheet.

The Health and Safety office will review the planned use, and after obtaining any necessary additional information, issue an internal approval number for the project.

8.0 ATTACHMENT

A Scaffolding Notification Worksheet

ATTACHMENT A

SCAFFOLDING NOTIFICATION WORKSHEET

Customer's Name: _____

Specific Jobsite Location: _____

Nearest Major Cross Street: _____

City: _____ County: _____

Name and Title of Site Supervisor: _____

Starting Date: _____ Estimated Completion Date: _____

High Voltage Lines in Proximity: YES _____ NO _____ How Near _____

Project Description: _____

_____

Height _____ Metal _____ Wood _____

Metal over 125 ft. _____ Wood over 60 ft. _____

Describe Chemical Hazards at Site: _____

_____

Subcontractor's Name: _____

Equipment to be Used: _____

Design Engineer: _____ Project Supervisor: _____

Phone: (___) _____ Project Number: _____ Profit Center: _____

Health & Safety Use Only

Permit Number: _____ Date Issued: _____ Expires: _____

Issued By: _____

ATTACHMENT P

HEALTH AND SAFETY FORM/POSTINGS

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Forms, Health and Safety**	**Document No.**	**25**
Date of Issue:	**November 1999**	**Revision No.**	**1**
Approval		**Approval**	

Page 1 of 15

HEALTH AND SAFETY FORMS

EQ VEHICLE ACCIDENT REPORT

EQ Vehicle

Driver _____ Accident date _____ Drivers license _____ State _____

Address _____

City _____ State _____ Zip _____

Work phone ( ) _____ State _____

Vehicle # _____ Year _____ Make _____ Model _____ Plate # _____

State _____ Vehicle owner: ☐ EQ ☐ Leased/Rented ☐ Private Vehicle

If not EQ owned: Owner _____ Address _____

_____ Phone _____

Vehicle damage _____ Est. repair cost _____

Other Vehicle(s)

Use of separate sheet if more than one

Driver _____ Drivers License _____ State _____

City _____ State _____ Zip _____

Phone ( ) _____ SS # _____

Owners name (check if same as driver ☐) _____

Address _____ City _____ State _____ Zip _____

Insurance company _____ Policy # _____

Agents name _____ Address _____ Phone # _____

Vehicle: Year _____ Make _____ Model _____ Plate # _____ State _____

Vehicle damage _____

Passengers ☐ YES (List on reverse) ☐ NO Injuries ☐ YES (List name & address on reverse) ☐ NO

Accident Description

Date _____ Time _____

Location _____

Description _____

_____

_____

_____

Witness _____ Address _____

_____ Phone # _____

Police Officer Name _____ Dept. _____

Report prepared by _____ Date _____

Print Signature

Manager _____

EQ GENERAL LIABILITY, PROPERTY DAMAGE, AND LOSS REPORT

Date Claim Submitted

Agent

Division/Subsidiary _____ Date __/__/__

Address _____

How Did Damage or Loss Occur: _____

Description of Damage or Loss: _____

Identification of Damaged or Lost Property: _____

Location of Damaged or Lost Property (Before Loss): _____

Date and Time of Damage or Loss: Date __/__/__ Time _____ AM / PM

Owner of Damaged or Lost Property:
Name _____ Phone No. _____
Address _____ City _____
Employer _____

Injured Parties (Complete also a Supervisors Employee Injury Report if an EQ Employee):

1. Name _____ Phone No. _____
   Address _____ City _____
   Employer's Name and Address _____
   Nature of Injury _____

2. Name _____ Phone No. _____
   Address _____ City _____
   Employer's Name and Address _____
   Nature of Injury _____

Witnesses:

1. Name _____ Phone No. _____
   Address _____ City _____
   Employer's Name and Address _____

2. Name _____ Phone No. _____
   Address _____ City _____
   Employer's Name and Address _____

Were Pictures Taken? ☐ Yes ☐ No

Were Police Notified? ☐ Yes ☐ No Dept. _____

Completed By: _____ _____ Date __/__/__
Name Printed Signature

Manager _____ Date __/__/__
Signature

USE BACK SIDE IF NECESSARY

EQ SUPERVISOR'S EMPLOYEE INJURY REPORT

Injured's name _____ Sex ____ S.S. No. _____ Birthdate _____

Home address _____ City _____ State _____ Zip _____ Phone _____

Job title _____ Hire date _____ Hourly wage _____

Date of incident _____ Time _____ Time reported _____ To whom? _____

Client name _____ Client address _____ Time shift began _____

Exact location of incident _____ Did employee leave work? ☐ No ☐ Yes When _____

Has employee returned to work? ☐ No ☐ Yes When _____ Did employee miss a regularly scheduled shift? ☐ No ☐ Yes

Doctor/Hospital name _____ Address _____

Witness name(s) _____ Statement Attached? ☐ No ☐ Yes

Nature of injury _____ Exact body part _____

Medical attention: ☐ None ☐ First aid on site ☐ Doctor's Office ☐ Hospital ER ☐ Hospitalized

Job assignment at time of incident _____ Job _____

Describe incident _____

What unsafe physical condition or unsafe act caused the incident? _____

What corrective action has been taken to prevent recurrence? _____

Supervisor/Foreman _____ _____ _____

Print Signature Date

HEALTH AND SAFETY

Concur with action taken? ☐ No ☐ Yes Remarks _____

OSHA Classification:

☐ Incident only ☐ First aid ☐ No lost workdays ☐ Lost workdays ☐ Restricted activity ☐ Fatality

Days away from work _____ Days restricted work _____ Total days charged _____

Name _____ _____ _____

Print Signature Date

PERSONNEL TRAINING* / MEDICAL MONITORING LOG

Name	Representing	Medical Exam Date	40 Hr. Hazwop. Date	8 Hr. Refresh. Date	8 Hr. Super. Date	H&S Plan Review Date	Respir. Fit Test	First Aid/CPR Date	Other:

* Include copies of all training certificates.

EQ Form PTMM 1/95

EQ TRAINING/MEETING RECORD

Location/Site: _____ Project No.: _____

Date: / / Time: _____ am/pm to _____ am/pm

Instructor(s): _____ _____

(Print Name) (Signature) (Print Name) (Signature)

Type of meeting (Circle all that apply):

Project Staff	Departmental Safety	Audio/Visual Classroom	O.J.T. Other: _____

Subject/Program: _____

Handout(s): _____

Proceedings: _____

ATTENDANCE ROSTER

I have received instruction/participated in the subject/program as described above and have had the opportunity to ask questions and receive answers on the contents of the program. I understand the training I have received and agree to abide by the standards presented herein. I also acknowledge receipt of any handout materials described above.

EMPLOYEE SIGNATURE	EMPLOYEE NAME (print)	REPRESENTING/SS NO.
1.		
2.		
3.		
4.		
5.		
6.		
7.		
8.		
9.		

Project No.: _____ Date: ____/____/____

ATTENDANCE ROSTER CONTINUED

EMPLOYEE SIGNATURE	EMPLOYEE NAME (print)	REPRESENTING/SS NO.
10.		
11.		
12.		
13.		
14.		
15.		
16.		
17.		
18.		
19.		
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33.		
34.		
35.		

Side 2

EQ HEAT STRESS PHYSIOLOGICAL MONITORING LOG

Site: _____ Date: _____ Safety Representative: _____

Ambient Conditions: _____ Start work area temp: _____ Stop work area temp: _____

NAME	REPRESENTING	AGE	MEDICAL NOTES	TIME IN	ORAL TEMP	HEART RATE	BODY WGT.	TIME OUT	ORAL TEMP	HEART RATE	BODY WGT.

Notation/Comments: _____

EQ SAMPLING EQUIPMENT CALIBRATION LOG

Site Name: _____ Project No.: _____

DATE/TIME	INSTRUMENT (Mfg./Model)	CALIBRATED BY	STANDARD (concent.-units)	METER READING	COMMENTS/ AMBIENT CONDITIONS

Page ___ of ___

EQ REAL TIME MONITORING LOG

Site Name: _____ Project No.: _____

DATE/TIME	SAMPLING LOCATION	INSTRUMENT (Mfg./Model)	MEASURED AGENT	RESULTS ( )	SAMPLED BY	COMMENTS/ ACTIVITIES

Page ____ of ____

Race, Color, National Origin, Sex:
In addition to the protection of Title VII of the Civil Rights Act of 1964, Title VI of the Civil Rights Act prohibits discrimination on the basis of race, color or national origin in programs or activities.

If you believe you have been discriminated against in a program of any institution which receives Federal assistance, you should contact immediately the Federal agency providing such assistance.

1/80

JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Provisions of the Act include the following:

Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discriminatory action.

Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

Proposed Penalty

The Act provides for mandatory penalties against employers of up to $1,000 for each serious violation and for optional penalties of up to $1,000 for each nonserious violation. Penalties of up to $1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to $10,000 for each such violation.

There are also provisions for criminal penalties. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of up to $250,000 (or $500,000 if the employer is a corporation), or by imprisonment for up to six months, or both. A second conviction of an employer doubles the possible term of imprisonment.

Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspector, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide consultative help and advice on solving safety and health problems or can refer you to other sources for help such as training.

Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State Labor or Health department or a State university.

Posting Instructions

Employers in States operating OSHA approved State Plans should obtain and post the State's equivalent poster.

Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or facsimile) in a conspicuous place where notices to employees are customarily posted.

More Information

Additional information and copies of the Act, specific OSHA safety and health standards, and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations.

Atlanta	(404) 347-3573
Boston	(617) 565-7164
Chicago	(312) 353-2220
Dallas	(214) 767-4731
Denver	(303) 844-3061
Kansas	(816) 426-5861
New York	(212) 337-2325
Philadelphia	(215) 596-1201
San Francisco	(415) 995-5672
Seattle	(206) 442-5930

Elizabeth Dole

Elizabeth Dole, Secretary of Labor

Washington, D.C.
1988 (Revised)
OSHA 2203

U.S. Department of Labor
Occupational Safety and Health Administration

EQ PROJECT H&S CHECKLIST

_____ SSP on site and a copy at PMO.

_____ Site maps (site location, evacuation routes, hospital route, etc.) posted at appropriate locations on site.

_____ Emergency telephone numbers posted at appropriate locations on site.

_____ Applicable Department of Labor posted at appropriate location on site:
- ° - OSHA Poster 2203 ('92)
- ° - State and Federal EEO Poster - EEOC-P/E-1 (2/92)
- ° - State and Federal Minimum Wage Poster - WH Publication - 1088 (10/96)
- ° - Employee Polygraph Protection Act - WH Publication 1462 (9/88)
- ° - Family and Medical Leave Act - WH Publication 1420 (6/93)
- ° - Service Contract Act - WH Publication 1313 (7/91)
- ° - Federally Financed Construction Projects - WH Publication 1321 (1/86)
- ° EQ Affirmative Action Policy (1/92)
- ° - Ohio Bureau of Workers' Compensation Certificate - BWC 1622 (3/96)

(Obtain posters from G. Koesters)

_____ Blank drum logs, accident/injury reports, daily safety meeting records, lockout tags, and hot work permits available.

_____ OSHA 200 log on site and up-to-date.

_____ All site workers' appropriate training and medical records available on site.

_____ Appropriate MSDSs (calibration gases, fuels, etc.) available on site.

_____ Equipment Inspection Forms (optional) available.

_____ Adequate First Aid Kit(s) (w/inspection forms) available on site.

_____ Emergency eyewash/shower (w/inspection form) available on site at appropriate location.

_____ Adequate fire extinguishers (w/inspection forms) available on site at appropriate locations.

_____ Safety fuel cans used for flammable liquid storage/use.

EQ PROJECT H&S CHECKLIST Cont'd

_____ Butt cans provided in smoking area (if applicable).

_____ Pressurized cylinders properly secured with chains, rope, etc.

_____ Adequate personnel decontamination facilities available on site in accordance with SSP (chairs, table, wash tubs, buckets, scrub brushes, paper towels, soap, respirator and boot racks, trash cans, plastic sheeting, duct tape, scissors, etc.).

_____ Adequate equipment decontamination facilities available on site in accordance with SSP.

_____ Drinking water, toilet facilities, and washing facilities available on site.

_____ Adequate lighting available throughout the site.

_____ Appropriate site set up in accordance with SSP and work zones (Support Zone, CRZ, and Exclusion Zone) delineated with caution tape, barrels, rope, etc.

_____ Monitoring equipment (PID, FID, LEL/0_2, colorimetric tubes, noise dosimeter, etc.)available in accordance with SSP and properly maintained/calibrated

_____ Appropriate calibration gases and valves available.

_____ Blank calibration and monitoring forms available.

_____ Chain of custody forms and custody tape available.

_____ Confined space entry equipment (i.e., lifeline, body harness, tripod, retrieval system, etc.) and blank permits available.

_____ PPE available on site in accordance with SSP (steel-toe work boots, hard hats, safety glasses, gloves, coveralls, respirators, CPC, hearing protection, duct tape, etc.)

_____ Emergency respirators, hoses, and regulators available on site in accordance with SSP.

No. _____

EQ HOT WORK PERMIT

This permit must be completed and authorized prior to commencing hot work in any area not specifically designated for hot work. This permit must be displayed in the permitted work area while hot work is performed and is void 30 minutes after work ceases or at shift's end, whichever comes first. Once this permit has expired, it must be returned to the Safety Representative or Safety Files.

Permit issued to: _____ Start time: _____ AM/PM, for this date only: _____ 19 _____

Project site/location: _____

Work to be performed: ___ welding; ___ cutting; ___ grinding; ___ hot equipment operation; describe: _____

PRE-WORK CHECKLIST

	Yes	or	N/A
1. Operations/site personnel are informed of work to be performed.	___		___
2. Project personnel are trained/debriefed in work to be performed.	___		___
3. All required PPE (i.e., flame-retardant clothing, tinted eye protection, etc.) is available (Type: _____).	___		___
4. All necessary portable fire extinguishers are provided (Type: _____).	___		___
5. All existing fire-suppression systems are operable (Type: _____).	___		___
6. A Fire Watch, which will remain for 30 minutes after hot work ends, is established.	___		___
7. Surrounding equipment and operations are safe for hot work.	___		___
8. Manholes, basins, and other floor/wall openings are covered.	___		___
9. Combustible items within 35 feet of hot work area have been removed or are otherwise covered with wetted tarpaulins or fire curtains.	___		___
10. Open vessels or lines within 35 feet of hot work are protected.	___		___
11. All necessary grounding/bonding wire is in place.	___		___
12. Energized utilities are locked and tagged out.	___		___
13. All tanks/lines/valves are disconnected, blanked, or locked out.	___		___
14. Equipment and all attached piping has been cleaned and purged (with: Water, Steam, Inert Gas, or Air).	___		___
15. Flammable dusts, vapors, liquids, and residues have been removed.	___		___
16. Flammable gases ≥ 10% of LEL have been purged.	___		___
17. All requirements for Confined Space Entry have been met.	___		___

Completed by: _____ Date: _____

ATMOSPHERIC TESTING RESULTS

Testing frequency: initial and _____ continuous, or _____ periodic (every _____ min.); ___ Atmospheric testing is not required.

Exact Test Location:	Time	% LEL	% Oxygen	Others		Tester's Initials

(Space is provided on the back of this form for additional results)

Special Instructions: _____

Local Emergency Response/Fire Department Phone Number: _____

Work Area Inspected and Permit Issued by: _____ Date: _____ Safety Rep Authorization: _____ Date: _____

(Signature) (Signature)

ATMOSPHERIC TESTING RESULTS (CONTINUED)

Exact Test Location:	Time	% LEL	% Oxygen	Others		Tester's Initials

ATTACHMENT Q

HOUSEKEEPING AND MATERIAL STORAGE

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Housekeeping**	**Document No.**	**33**
Date of Issue:	**November 1999**	**Revision No.**	**1**
Approval		**Approval**	

Housekeeping hazards produce congestion, disorder, dirt, waste, trash, and other obstacles and can lead to slips, trips, and falls which can cause strains, sprains, broken bones, contusions, fractured ribs, and fatalities.

Work areas shall be kept sufficiently clean and orderly so that work activities can proceed in an efficient and safe manner in order to maintain safety and quality. These areas will be adequately lighted, ventilated, protected, and accessible as appropriate for the work being performed. Machinery and equipment will be arranged and stored to permit safe, efficient work activities and to provide ease in cleaning. Tools and accessories will be safely stored in cabinets, racks, or other suitable devices out of traffic areas.

Sufficient waste containers and receptacles will be provided in appropriate locations and will be emptied regularly. Work areas and floors will be maintained free of materials debris, obstructions, foreign materials, or slippery substances such as oil, water, and grease.

Aisles, traffic areas, and exits will be maintained free of materials and debris. Combustible materials will be stored in approved containers and will be properly disposed of. Waste rags will be stored in metal containers. All flammable liquids will be stored in safety cans. Dangerous materials will be stored in areas outside of the work area.

Personnel will be held accountable for keeping their work areas clear of housekeeping hazards.

R

ATTACHMENT R

SECURITY PERSONNEL

Environmental Quality Management, Inc.

Standard Operating Procedure

Title:	**Security Personnel**	**Document No.**	**59**
Date of Issue:	**November 1999**	**Revision No.**	**1**
Approval		**Approval**	

SECURITY PERSONNEL AT ERRS SITES

INTRODUCTION

This document describes guidelines developed for Security Personnel at the _____ Site to protect site personnel, visitors, and the public from physical harm and exposure to hazardous materials or wastes and to provide security for equipment and material. All security personnel are performing their duties as an ERRS subcontractor under the direction of Environmental Quality (EQ) and/or EQ's lead onsite cleanup contractor. As such, security companies and their associated personnel must comply with the procedures contained in this SOP.

The procedures and guidelines contained herein were based on the best available information. Specific requirements will be added when new information is received or conditions change. A written amendment will document all changes made. Security personnel will also adhere strictly to their company regulations.

DAILY SAFETY MEETINGS

A daily safety meeting will be held with the ERRS Response Manager, or his designee, to ensure that all personnel understand site conditions and operating procedures. Security personnel will be informed of any changes in site conditions or of any new or special requirements at this time. This information will be passed on to each successive security personnel shift.

SOP ACCEPTANCE ACKNOWLEDGMENT

Security personnel are responsible for reading and understanding these procedures and signing an acknowledgment form.

1.0 ROLES AND RESPONSIBILITIES

On-Scene Coordinator (OSC):

The OSC, as the representative of the U.S. EPA, is responsible for overall project administration and for coordinating activities of all individuals at the site at all times. All U.S. EPA and contractors guidelines and requirements as well as all applicable OSHA standards shall be applied. The OSC is the overall site supervisor and will be responsible for the management of on-site visitors. However, each contractor has an ultimate responsibility to direct all activities of all contractor personnel on site. Any direction from the OSC to ERRS personnel should normally be issued through the ERRS Response Manager.

Response Manager (RM):

The Response Manager, as the field representative for the ERRS clean-up contractor, has the responsibility for fulfilling the terms of the delivery order. The RM must oversee the project and ensure that all technical, regulatory and safety requirements are met.

Superfund Technical Assessment and Response Team (START):

The Superfund Technical Assessment and Response Team is responsible for providing the OSC with assistance and support in regards to all technical, regulatory and safety aspects of site activity.

Site Health and Safety Officer (HSO):

The ERRS and START Site Safety Officers will be assigned to the site on a full-time basis with functional responsibility for implementing the Site Health and Safety Plan as it applies to ERRS and START personnel. The Response Manager is the designated ERRS HSO. The Lead START Member is the designated START HSO unless otherwise appointed.

Security Personnel:

Hours for Security Personnel will vary as work schedules vary. The ERRS RM or his designee will notify Security Personnel of changes in the work schedule. Guards must inquire as to new or special orders at the beginning of each guard shift. New or special orders must be passed on to each successive guard shift. Responsibilities of Security Personnel will vary depending on who is present onsite (e.g., Guard only or Guard and Site Personnel).

SITE MAP

Guard only on site:

- Continually patrol Clean Zone as indicated on the Example Map and as directed by the RM or OSC.

- Sound the alarm or notify appropriate (local police, fire department, RM, OSC, EQ) personnel in the event of an emergency. See Section 6.

Guard and Site Personnel on site:

- Follow instructions and directions as provided by the RM or OSC.

Other:

Any person who observes security, safety or other problems should immediately report observations/concerns to the ERRS RM or other appropriate personnel (ERRS Foreman, OSC, or START).

2.0 CLOTHING AND EQUIPMENT

Security personnel will wear easily identifiable uniforms consistent with their duties. Steel toe shoes/boots will be worn at all times while on site. Hard hat and safety glasses will also be worn when specified. Hard hats and safety glasses will be provided by the ERRS Contractor. Any other special safety clothing or equipment which could be required will be stipulated by the RM and provided by the ERRS contractor.

Uniforms will be neat and clean.

3.0 WORK ZONES - SITE CONTROL

The primary purpose for site controls is to establish the hazardous area perimeter, to reduce migration of contamination into clean areas and to prevent access or exposure to hazardous materials by unauthorized persons. At the end of each workday, the site will be secured or guarded to prevent unauthorized entry. Site work zones will include the Clean/Support Zone, the Decontamination Zone, and the Exclusion/Hot Zone. Security Personnel activities will be limited to the clean/support zone and the perimeter of the geographic site. The site work zones are described in the following subsections to aid Security Personnel in identifying site areas and boundaries. The example map identifies the various Work Zones at a typical ERRS Site.

3.1 Clean Zone/Support Zone

This uncontaminated support zone or clean zone is the area outside the exclusion and decontamination zones and within the geographic perimeters of the site. This area is used for staging of materials, parking of vehicles, office and laboratory facilities, sanitation facilities, and receipt of deliveries. Personnel entering this zone may include delivery personnel, visitors, security guards, etc., who will not necessarily be permitted in the exclusion zone. All personnel arriving in the support zone will upon arrival, report to the command post and sign the site entry/exit log. There will be one controlled entry/exit point from the clean zone to the decontamination zone.

3.2 Decontamination Zone

The decontamination zone provides a location for removal of contaminated personal protective equipment and final decontamination of personnel and equipment. All personnel and equipment will exit via the decon area. A separate decontamination area will be established for heavy equipment.

The decontamination zone is a buffer zone between contaminated and clean areas. It will be identified by yellow banner guard.

3.3 Exclusion Zone/Hot Zone

The exclusion zone will be the "hot-zone" or contaminated area inside the site perimeter. Entry to and exit from this zone will be made through a designated point and all personnel will be required to sign the hot zone entry/exit log located at the decon area. Appropriate warning signs to identify the exclusion zone will be posted (i.e., "DANGER - AUTHORIZED PERSONNEL ONLY," "PROTECTIVE EQUIPMENT REQUIRED BEYOND THIS POINT," etc.). Security Personnel are prohibited from entering the Exclusion Zone.

The Exclusion Zone will be identified by a red banner guard, and includes the entire structural facility as well as within containment walls of outside tanks.

4.0 GENERAL FIELD RULES

- All visitors will be sent to the command post and referred to the OSC.

- Visitors are not allowed in the work areas without authorization. Access to the properties is restricted to the EPA and authorized representatives. Personnel must sign in at the Command Post and receive authorization to enter the site.

- It is EPA policy to practice administrative hazard control for all site areas by restricting entrance to exclusion zones to essential personnel and by using operational SOPs.

- Eating, drinking, or smoking is permitted only in designated areas in the support zone.

- Personnel will only travel in vehicles where individual seats (for each occupant) are provided. Seat belts will be worn as required.

- Fire extinguishers will be available on site and in all areas with increased fire danger such as the refueling area.

- Employees will not interfere with or tamper in any way with air monitoring equipment.

- A visitor log will be maintained at the command post or with the security guard. All personnel coming on site will sign in and out.

- Security will be maintained at the fenced site by closing all gates during normal work hours. The OSC will assume responsibility for personnel entering site. Site will be locked in the evening.

- EPA OSC will allow only those individuals authorized to enter the site. If unauthorized members of the public are found on site, security personnel will be contacted immediately. The individual must not be left unattended.

- Visitors are not allowed in the work areas without authorization. Access to the properties is restricted to the EPA and authorized representatives. Personnel must sign in at the Command Post and receive authorization to enter the site.

- Communication Procedures - Security Personnel may be required to carry radios. Radios will be used for onsite communications, and the Channel to be used will be determined.

ERRS Contractor (Environmental Quality Management, Inc.) Contacts

EQ ERRS	800-500-0575 (24 hr)
EQ ERRS H&S - Tom Wey	513-825-7500
Home	513-677-2487
EQ ERRS H&S - Gene Koesters	513-825-7500
Home	513-831-0579
EQ Corporate H&S - John Kominsky	513-825-7500

Subcontractors

Regional Manager	_____
Project Manager	_____
Regional H&S Manager	_____
Regional Manager	_____

START Contractor (Ecology and Environment, Inc.) Contacts

E and E Regional Office (for this site)	_____
E and E MEDTOX Emergency Medical Hotline	501-221-0463 (24 hr)
	904-462-3277/3281
E and E Corporate H&S - Dr. Paul Jonmaire	716-684-8060
E and E Emergency Operations Center Hotline	716-684-8940 (24 hr)
	716-684-8060
START Leader Region V - Thomas Kouris	312-663-9415
	219-924-1341
Federal Occupational Health Unit	312-353-0379

5.3 Emergency Equipment Available On Site

Communications Equipment Location

Public Telephones: _____

Contractor Telephones: ERRS _____
START _____

Emergency Alarms/Horns: _____

Medical Equipment

First Aid Kits: _____

Inspection Date: _____ By: _____

Stretcher/Backboard: _____ By: _____

Eye Wash Station: Decon Zone (within 100 feet of hazard zone)

Safety Shower: Decon Zone

Fire-Fighting Equipment

Equipment will be positioned throughout the site.

Fire Extinguishers: _____

Inspection Date: _____By: _____

Additional Emergency Equipment

_____

5.4 Accident Reporting/Investigations

- All injuries or accidents within the Security Guards responsibility area must be reported to the Response Manager or Site Safety Officer immediately.
- The Response Manager will conduct an immediate investigation of the accident and document all results on the Supervisor's Accident Investigation Report and State Worker's Compensation Form.
- The Response Manager will assign a supervisory individual to accompany all injured personnel to the clinic and follow guidelines outlined in the Return to Work Program.
- Copies of all Supervisor's Accident Reports will be sent to the Environmental Quality Management, Inc. Corporate Director of Health and Safety.

6.0 EMERGENCY RESPONSE CONTINGENCY PLAN

Responsibilities of Security Personnel may vary depending on who is present on site at the time of an emergency (e.g., Guard only or Guard and Site Personnel) and the type of emergency encountered.

6.1 Guard Only on Site

- Trespassing/vandalism - Notify local police and then RM, EPA and EQ personnel.
- Fire, explosions, chemical release - Notify local fire department, police and appropriate responders (Section 5).

6.2 Guard and Site Personnel On Site

- Trespassing, vandalism - Notify local police and then RM, EPA and EQ personnel.
- Fire, explosion, chemical release - Notify the RM or OSC of the emergency immediately; rally to the office trailer.
- Follow general rules and procedures as specified in this SOP and other sources as provided on site.

6.3 Evacuation

- If evacuation is necessary and the Office Trailer is not accessible or the office phones are not operable, the Guard(s) should leave the site, and report the emergency as directed by the RM or OSC.

Directions to (FIRST EVACUATION LOCATION):

_____

_____

_____

Directions to (BACKUP EVACUATION LOCATION):

In the event that the site is evacuated, Guard(s) will wait for Emergency Responders as directed by the RM or OSC. The Guard will wait for further instructions from authorized Site Personnel.

Again, Security Personnel should inquire daily with the RM and/or OSC as to any changes in either the procedures for responding to emergencies or who to contact in case of emergencies. Also, Security Personnel must always employ safe, common sense practices in responding to emergencies, including but attempting to directly respond to or alleviate an emergency on their own, when seeking additional support is the more logical and appropriate approach. Further, Security Personnel should never enter the hot zone areas without proper instructions, direction or protective clothing.

SECURITY PERSONNEL ACKNOWLEDGMENT FORM

I have been informed and understand and will abide by the procedures set forth in the Security Personnel Standard Operating Procedures for the _____ site.

Printed Name	Signature	Representing	Date

Z

ATTACHMENT Z

SITE SAFETY PLAN

ACKNOWLEDGMENT FORM

SITE SAFETY PLAN ACKNOWLEDGMENT FORM

I have been informed and understand and will abide by the procedures set forth in the Site Safety Plan and respective Amendments, if any, for the Outboard Marine Site.

Printed Name	Signature	Representing	Date
Jeff Kimberlin		EQM	5/12/03
Ben Ring		EQM	5/12/03
Jeff Spradlin		EQM	5/12/03
Kenny Kinsella		EQM	5/12/03
Adam Baggs		EQM	5-12-03
Steve Wiechert		ER	5-12-03
Gary Butcher		ER	5-12-03
K. Theisen		EPA	5-12-03
J Rumford		EQ	5-12-03
Ken Brown		TIOMI (START)	5/12/03
[illegible]		ER	6/2/03
Maggie Tinkham		TIEMI (START)	6-5-03
Mark Dunkle		EQ	6-9-03
Ken Rhame		EPA	6-13-03
Jim Mitchell		EPA	6-16-03
[illegible]		EPA	6/27/03

PERMIT-REQUIRED CONFINED SPACE ENTRY PERMIT

Date Valid: 5/22 From: 1430 A.M./(P.M.) To: 1630 A.M./(P.M.) Permit No: 006
Confined Space Description: PIPE CHASE IN OLD DIE CAST AREA NORTH SIDE OF PLANT
Purpose of Entry: VIDEO TAPE TUNNEL, REMOVE ANY PCB CAPACITORS DRUMS OR SMALL CONTAINERS OR CYLINDERS
Hazards:
Authorized Entrants: KEN BROWN JIM RUMSFORD JEFF RHINEHOLD
Attendant: BEN RING Fire Watch (Hot Work):

PRE-ENTRY ATMOSPHERIC TESTING

	PEL	Reading	Time	Intervals
1. Oxygen	19.5-23.5%			
2. Flammability	< 10% LEL			
3. Carbon Monoxide	25 ppm			
4.				
5.				
6.				

ACCEPTABLE ENTRY CONDITIONS

- ____ Lock & Tag
- ✓ Lighting
- ____ Barricades
- ____ Posting
- ____ Pre-Entry Briefing
- ✓ Ventilation
- ✓ Communications
- ____ Fire Extinguisher
- ____ Emergency Plan
- ____ Other*

ISOLATION/LOCKOUT

- ____ Water
- ____ Electrical
- ____ Mechanical
- ____ Hydraulic
- ____ Other*

*Specify:

SAFETY EQUIPMENT

Respirators
- ____ SCBA
- ____ Airline/Egress
- ____ Egress Only
- ____ APR
- ____ Other*

Clothing
- ✓ Hard Hat
- ____ Safety Shoes
- ____ Safety Glasses
- ____ Goggles
- ____ Ear Plugs
- ____ Overalls*
- ✓ Chem. Suit*
- ✓ Gloves*
- ✓ Overboots
- ____ Other*

Other
- ____ Life Line & Harness
- ____ Tripod & Pulley
- ____ Wristlets

*Specify:

RESCUE & EMERGENCY SERVICES

Type of Emergency/Rescue Team required: On-site ____ Off-site ✓ Phone 911

CONTRACTOR NOTIFICATION: Permit Conditions ____ Potential Hazards ____

PERMIT AUTHORIZATION/CANCELLATION

I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Entry Supervisor: JEFF RHINEHOLD Signature: [signature] Date: 5/22/03

I certify that this permit is no longer valid and shall not be utilized for further entry procedures.

Entry Supervisor: ____ Signature: ____ Date: ____

Reason: ____

PERMIT-REQUIRED CONFINED SPACE ENTRY PERMIT

Date Valid: 5/20 From: 1230 A.M./(P.M.) To: 1830 A.M./(P.M.) Permit No: 003
Confined Space Description: PIPE CHASE # 1 OLD DIE CAST AREA

Purpose of Entry: VIDEOTAPE TUNNEL / ASSESS CONDITION OF TUNNEL

Hazards: LOW CEILINGS / LIMITED LIGHT / PIPES
Authorized Entrants: KEN BROWN JEFF RHINEFIELD
Attendant: BEN RING Fire Watch (Hot Work): N/A

PRE-ENTRY ATMOSPHERIC TESTING

	PEL	Reading	Time	Intervals
1. Oxygen	19.5-23.5%	21.1	1400	
2. Flammability	< 10% LEL	0	1400	
3. Carbon Monoxide	25 ppm			
4.				
5.				
6.				

ACCEPTABLE ENTRY CONDITIONS

____ Lock & Tag
____ Lighting
____ Barricades
____ Posting
____ Pre-Entry Briefing
✓ Ventilation
✓ Communications
____ Fire Extinguisher
____ Emergency Plan
____ Other*

ISOLATION/LOCKOUT

____ Water
____ Electrical
____ Mechanical
____ Hydraulic
____ Other*

*Specify:

SAFETY EQUIPMENT

Respirators
____ SCBA
____ Airline/Egress
____ Egress Only
____ APR
____ Other*

Clothing
✓ Hard Hat
✓ Safety Shoes
____ Safety Glasses
____ Goggles
____ Ear Plugs
____ Overalls*
✓ Chem. Suit*
✓ Gloves*
✓ Overboots
____ Other*

Other
____ Life Line & Harness
____ Tripod & Pulley
____ Wristlets

*Specify:

RESCUE & EMERGENCY SERVICES

Type of Emergency/Rescue Team required: On-site ____ Off-site ✓ Phone ____

CONTRACTOR NOTIFICATION: Permit Conditions ____ Potential Hazards ____

PERMIT AUTHORIZATION/CANCELLATION

I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Entry Supervisor: JEFF RHINEFIELD Signature: [signature] Date: 5/21/03

I certify that this permit is no longer valid and shall not be utilized for further entry procedures.

Entry Supervisor: ____ Signature: ____ Date: ____

Reason: ____

PERMIT-REQUIRED CONFINED SPACE ENTRY PERMIT

Date Valid: 5/14 From: 0730 (A.M.)/P.M. To: 1830 A.M./(P.M.) Permit No: 002
Confined Space Description: PIT UNDERNEATH CHIP WASHER ROOM
Purpose of Entry: DECON PIT / REMOVE SLUDGE CHIPS
Hazards: PCBS / RCRA METALS IN SLUDGE CHIPS
Authorized Entrants: ADAM BAGGS STEVE WECKER
Attendant: GARY BUTNER Fire Watch (Hot Work): _____

PRE-ENTRY ATMOSPHERIC TESTING

	PEL	Reading	Time	Intervals
1. Oxygen	19.5-23.5%	20.8	0730	
2. Flammability	< 10% LEL	0	0730	
3. Carbon Monoxide	25 ppm			
4.				
5.				
6.				

ACCEPTABLE ENTRY CONDITIONS

		ISOLATION/LOCKOUT
____Lock & Tag	____Ventilation	____Water
____Lighting	____Communications	____Electrical
____Barricades	____Fire Extinguisher	____Mechanical
____Posting	____Emergency Plan	____Hydraulic
____Pre-Entry Briefing	____Other*	____Other*

*Specify: _____

SAFETY EQUIPMENT

Respirators	Clothing		Other
____SCBA	✓ Hard Hat	____Overalls*	____Life Line & Harness
____Airline/Egress	✓ Safety Shoes	✓ Chem. Suit*	____Tripod & Pulley
____Egress Only	____Safety Glasses	✓ Gloves*	____Wristlets
____APR	____Goggles	✓ Overboots	
____Other*	____Ear Plugs	____Other*	

*Specify: _____

RESCUE & EMERGENCY SERVICES

Type of Emergency/Rescue Team required: On-site _____ Off-site ✓ Phone 911

CONTRACTOR NOTIFICATION: Permit Conditions _____ Potential Hazards _____

PERMIT AUTHORIZATION/CANCELLATION

I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Entry Supervisor: JEFF RHINEHEART Signature: [signature] Date: 5/14/03

I certify that this permit is no longer valid and shall not be utilized for further entry procedures.

Entry Supervisor: _____ Signature: _____ Date: _____

Reason: _____

PERMIT-REQUIRED CONFINED SPACE ENTRY PERMIT

Date Valid: 5/13 From: 0800 (A.M.)/P.M. To: 1830 A.M./(P.M.) Permit No: 001
Confined Space Description: PIT / SUMP AREA CHIP WASHER ROOM
Purpose of Entry: CLEAN FLOOR OF PIT / REMOVE SLUDGE
Hazards: PCB / METALS IN SLUDGE
Authorized Entrants: ADAM BAGGS / STEVE WEICKEL
Attendant: GARY BUTLER Fire Watch (Hot Work):

PRE-ENTRY ATMOSPHERIC TESTING

	PEL	Reading	Time	Intervals
1. Oxygen	19.5-23.5%	20.8%	0730	
2. Flammability	< 10% LEL	0	0730	
3. Carbon Monoxide	25 ppm			
4.				
5.				
6.				

ACCEPTABLE ENTRY CONDITIONS

____ Lock & Tag
____ Lighting
____ Barricades
____ Posting
____ Pre-Entry Briefing
____ Ventilation
____ Communications
____ Fire Extinguisher
____ Emergency Plan
____ Other*

ISOLATION/LOCKOUT

____ Water
____ Electrical
____ Mechanical
____ Hydraulic
____ Other*

*Specify:

SAFETY EQUIPMENT

Respirators
____ SCBA
____ Airline/Egress
____ Egress Only
____ APR
____ Other*

Clothing
✓ Hard Hat
____ Safety Shoes
____ Safety Glasses
____ Goggles
____ Ear Plugs
____ Overalls*
✓ Chem. Suit*
✓ Gloves*
✓ Overboots
____ Other*

Other
____ Life Line & Harness
____ Tripod & Pulley
____ Wristlets

*Specify: FULL FACE RESPIRATORS

RESCUE & EMERGENCY SERVICES

Type of Emergency/Rescue Team required: On-site ✓ Off-site ____ Phone ____

CONTRACTOR NOTIFICATION: Permit Conditions ____ Potential Hazards ____

PERMIT AUTHORIZATION/CANCELLATION

I certify that I have inspected the work area for safety and reviewed all safety precautions recorded on this permit.

Entry Supervisor: JEFF RHINEFIER Signature: [signature] Date: 5/13/02

I certify that this permit is no longer valid and shall not be utilized for further entry procedures.

Entry Supervisor: ____ Signature: ____ Date: ____

Reason: ____

ERRS REGION V
WORK PLAN
Contract No. 68-S5-9801

Site Name: Outboard Marine Corporation (OMC)

Prepared by: Jeff Rhinefield Date: April 30,2003

Preplanning Meeting Date: March 25, 2003 Attendees: Jeff Rhinefield EQM,

Ken Theisen, USEPA OSC, Ken Brown, START, Jim Rumsford, EQM

PART 1. SITE INFORMATION AND BACKGROUND

Task Order No.: 9801-05-117 EPA Site No.: 0528

Site Address: 90 Seahorse Drive, Waukegan, Illinois, 60085

EPA FOSC: Ken Theisen Office No.: (312) 886-1959

Site Telephone No.: EQ (847) 782-0652, USEPA (847) 782-0608, FAX (847) 782-0658

Site Background and Description:

A. Type of Site: Manufacturing facility of outboard marine engines

B. History of Site and Type of Activities: OMC was built during several phases between 1927 and 1975. Plant #1 Manufacturing activities included aluminum and cast iron machining, electroless tin plating, spray painting, wastewater treatment, final assembly of outboard motors, vapor degreasing with chlorinated solvents, chromate conversion coating, engine testing, die-casting and electroplating. Plant #2 was built in 1949. Its manufacturing operations included aluminum smelting and holding, aluminum die-casting, aluminum machining, polishing and finishing, spray painting, parts assembly, parts washing, chromate conversion coating and wastewater pretreatment. There are two sets of pipe chases underneath the floor in the east and west ends of Plant #2. OMC used hydraulic fluid containing polychlorinated biphenyls (PCB) in its die casting operations from 1961 to 1972. In the 1980's, sediment in Slip#3 and the Waukegan Harbor was found to contain PCB's at 500PPM and over. The PCB was reportedly discharged through floor drains to the North Ditch and Slip#3 of the Waukegan Harbor. Between 1989 and 1995, remedial activities included hydraulic dredging of sediment in the North Ditch and Waukegan Harbor, thermal treatment of the sediments, and placement in three containment cells constructed onsite, the East and West Containment Cell and Slip#3.Each cell has well systems that maintain inward hydraulic gradient.

C. Wastes on Site (chemical names, amount of spill, no. of drums, no./vol. tanks, no./size lagoons, etc.

Approximately 20,000 Sq. Ft. of PCB, RCRA metals (Chromium and Lead) contaminated floor in Metal Working area, Plant #2, 27-300 gallon PCB transformers on the roof of Plant 2 and inside, a 3000 gallon tanker on the north side of Plant 2 with 50 gallons of residual PCB oil and water inside, approx. 1000 Sq. Ft. and 150 lineal ft. of friable ACM pipe and tank insulation in the North Boiler Room, a RCRA metal contaminated baghouse and filter bags in the grit blasting area, several dozen mercury contaminated thermostats throughout the plant, and approximately 1-55 gallon drum of PCB and VOC contaminated (Xylene, Toluene, Ethylbenzene). 4-Methyl-2-Pentanone) metal chips and residual oil in the chip wringer area.

D. Description of Site Physical Features: (acreage, buildings, surrounding population, etc.):

A 124 acre property in Lake County Illinois bordering the Waukegan Harbor, with Lake Michigan and a municipal beach to the east, the Elgin Joliet Railroad to the west, the North Shore Sanitary District to the north, and the National Gypsum plant to the sough.

OMC is directly across the street from Larsen Marine and the Waukegan Yacht Club. The harbor is very active with commercial fishing on Lake Michigan, a very active pleasure craft usage for inhabitants of Lake County, and large commercial tankers and barges bringing raw materials to the bordering manufacturing facilities. Great Lakes Naval Training is approximately 6-8 miles south of the harbor.

E. Site Facilities:

Electricity, running water, telephone: Plant #2 will provide office space that will be used as a command post. The plant will have electricity and access to decon water for the remedial activities, phones and a fax line will be installed in the command post, potable water coolers will be provided, and temporary restrooms will be utilized during the cleanup.

PART 2. SCOPE OF WORK AND APPROACH

2.1 Tasks

Mobilization: Mobilization will occur on Monday, May 12,2003. The Springfield Belle was mobilized to the OMC plant on Friday April 25, 2003, from its previous remedial site. The Response Manager, Field Cost Accountant, Water Treatment Manager and Tech, Foreman, and two Cleanup Technicians will mobilize, bringing (2) 20' storage trailers containing small tools and equipment for the crew and the water treatment crew. A 20,000 gallon frac tank for pre-treatment and containment of untreated water will be mobilized along with a 8000 lb. Forklift for moving small storage tanks and drums and equipment around the plant.

Site Logistics:

Entry: Entry to the OMC plant #2 will be through a service door on the south side of the plant, along Seahorse Drive, near the former Grit Blasting Area.

Security: Presently there is 24 hr. unarmed security at Plant #2 being provided by Ohlson Security. When remedial work begins, security will be provided after working hours and on weekends and holidays.

Office Trailer: The offices in the plant will provide for EQ a command post and break area.

Decon Area: Decon stations will be set up in the plant according to the areas that work is being conducted in. That decon station will consist of a drum for discarded PPE, a boot wash, a hand wash, and chairs. An area where the crew can decon themselves prior to break and lunch will be provided next to the command post offices, and will include a respirator wash, hand wash and tables and chairs for breaks, along with liquid replenishments.

Other: Parking for company vehicles and for crew vehicles will be in an enclosed dock area near the south boiler room. The Springfield Belle will be set in the Old Die Cast Area to begin operations. The treatment of water from decon activities in the Metal Working Area, and the treatment of water from underground pipe chases will begin there before the Belle is moved to the east end of the plant and the New Die Cast Area.

Initial Containment/Control: EQ will isolate the areas of contamination in Plant #2 with yellow barricade tape to prevent entry of personnel or equipment. An evaluation will be made of those areas to determine if any contamination is leaking or leaching through rainwater or storm runoff, and physical measures will be taken to divert it. The areas in the plant, specifically the metal working area, with areas of oil on the floor, will be cleaned with oil dry and pads. Any process equipment, or transformers with valves that can be opened will be secured. The pipe chases underneath the Old Die Casting and New Die Casting area, will be measured and monitored to assure that no water is leaching from those chases through bad plugs into the North Ditch or the Harbor.

Primary Cleanup Activities: EQ will begin the remedial activities in the Metal Working Area. Based on results from the EPA wipe sampling activities on March 26, EQ will decon contaminated areas of the floor based on a cleanup criteria of <10 or equal to 10 micrograms(ug) PCBs per 100 cm2. EQ will apply a cleaning agent through portable sprayers to the appropriate area, scrub the agent in with long handled scrub brushes, then power wash the area using a 3000 psi pressure washer. The rinsate will be vacuumed up using a 55 gal. Drum mounted vacuum, and then wipe sampled for PCBs. A second application will be applied based on the initial sampling results, and those areas will be resampled after EQ determines that the decon activities in that area are sufficient. Those areas will be isolated to prevent cross contamination during remedial activities. All PCB decon in that area will be done in Level "C" PPE, with poly coated tyvek. The decon activities in that area will also require EQ to possibly have to rig and move some equipment to access the contaminated area easily. Cold cutting or dismantling and the equipment and moving it with a 8000 lb. Forklift will be the method of choice. If the need to hot cut the equipment arises, the hot cutting of the equipment will be done in Level "C" because of the possibility of residual PCB contamination. EQ will contain all decon water to be processed with the water from the underground pipe chases in the Old and New Die Cast area. The estimated 500,000 gallons of water onsite will be treated utilizing the USEPA's mobile water

treatment unit, the Springfield Belle. The water from the pipe chases will be treated through the treatment unit, and EQ will access the tunnels after the area is monitored and a confined space permit is issued. EQ anticipates being able to enter the tunnel with modified Level "D", and visually inspect for any leaks in previously plugged areas. If any residual oil is present in the tunnels, the tunnel will be decontaminated using the same process outlined for the Metal Working Area. Upon completion of activities in the tunnel, EQ will videotape the conditions of the pipe chases for future record. A 3000 gallon tanker outside Plant #2 appears to have oil and water present in the bottom of the tanker near the effluent lines. EQ will monitor the tank for LEL/02, and issue a confined space permit for the entry and decon of the interior of the tanker. Level "C" PPE will be worn for the interior decon, and after the tanker is pressure washed and all decon water is removed, the tanker will be rendered inoperable by cutting holes in both sides of the tanker. The tank will be monitored for LEL/02 before hot cutting the tanker. EQ will decontaminate a pit in the Chip Wringer room on the north side of the plant. The pit contains a small amount of oil soaked chips. EQ will vacuum out the chips with a 55 gallon dry vacuum unit, then decon the floor with the same procedures and cleanup objectives outlined in the scope of work for other areas. Upon completion, a wipe sample will be taken for RCRA metals, and PCB's. A baghouse in the Grit-Blasting area will need to be entered and deconned. The baghouse was part of the process of grit blasting metal parts manufactured onsite. Because of the possibility of a combustible or explosive atmosphere in the baghouse, spark proof tools will be used to open the baghouse on both sides, and allow for venting of the interior. The inside of the baghouse will be monitored for LEL/02, then EQ will remove the old bags for disposal. The inside of the baghouse walls will be deconned with the cleaning agent and pressure washing. EQ anticipates doing the baghouse work in Level "C" PPE. 2-3 small pressure tanks in the North Boiler Room contain friable ACM insulation. EQ will notify the ILEPA and ILDPH with a 10 day notification that the vessels will be abated. After verification that the vessels are empty and not under pressure, EQ will proceed to abate the boilers. The area will be set up for perimeter monitoring, and licensed abatement contractors will wet, then double wrap the boilers with 6 mil. Poly, duct tape, and asbestos labels. The tanks will be cut loose from their tank saddles, and have the pipe openings sealed before transport offsite as ACM waste. Personnel monitoring of 25% of the crew will be conducted during ACM removal activities. EQ will identify and drain into containers all solvent and hydraulic fluid lines associated with the Remedial Cleanup areas of this scope of work. After identification of lines, the lines will be plumbed to allow purging of the lines using low psi air from a portable air compressor. The lines and equipment will be grounded before purging of any solvent lines. All product contained will be sampled for PCB or VOC's and flashpoint before offsite disposal. Any hydraulic lines containing PCB oil will be drained and flushed for 24 hrs. with a diesel rinsate. The flushing and draining of lines will be conducted in Level "C" PPE. 27-300 gallon PCB transformers remain on the roof and throughout the interior of Plant#2. EQ will drain all PCB fluids from those transformers, and drain and flush those transformers with a diesel rinsate. All liquids generated will be contained for offsite disposal as "Hazardous Waste, Liquid, PCB material. The draining and flushing of the transformers will be conducted using Level "C" PPE. A licensed electrician will be used to disconnect all power to the transformers before they are opened and drained.

Onsite Treatment: EQ will utilize the USEPA's mobile water treatment unit, the Springfield Belle, to treat the estimated 500,000 gallons of trapped runoff water in the underground pipe chases in the Old and New Die Cast area of Plant #2. All decon water associated with the remedial cleanup of the Metal Working area, will also be contained and treated onsite before discharge. A 20,000 gallon frac tank will be used as a pre-treatment settling tank. The water will be pumped from the chases through a 220 volt , 3" submersible pump, into the frac tank. All decon water generated from floor and equipment decon will be stored in a 1000 gallon poly

tank before transfer into the frac tank. After the waters are composited, and allowed time to settle, the water will be pumped through a bank of 4, 5 micron sock filters into the multi-media filter and through the carbon filter. An effluent sample will be taken before discharge to the outside holding impoundment, and analyzed for a total PCB scan, RCRA metals, and VOC's.

Onsite Waste Staging/Management: All rinsate/decon water generated onsite will be treated and discharged onsite through the Springfield Belle. The solids generated during the cleanup process, (PPE, metal chips, sludge, old baghouse bags) will be containerized in Open-top 55 gallon drums for sampling and offsite disposal. An area near the loading dock in the Parts Storage area will be isolated and labeled with barrier tape, and the drums will be stored for loading onto trucks from the interior dock area. Liquids generated onsite(hydraulic fluids, flammable solvents) will be contained in Closed-top 55 gallon drums, and also staged near the dock area. The waste will be segregated according to waste streams, and bulked if necessary for disposal in the same area. Drums and small poly tanks will be palletized and moved inside the plant using a 8000 lb. Forklift. The area the drums are stored in will have all floor drains sealed with visqueen and sandbags.

Waste Transportation and Disposal: The solid waste generated during the remedial decon activities(PPE, Sludge, Metal Chips, Debris) will be stored in Open top 55 gallon drums for disposal. A composite sample will be taken of the solids, to determine if it can be sent offsite as a non-hazardous waste solid to a Subtitle "D" Landfill, or if it needs to be sent offsite as a hazardous waste, solid, for landfilling or treatment. All liquids and solids that can be bulked for transport by either rolloff or tanker will be done onsite. PCB liquids over 50ppm, will be bulked and shipped offsite for incineration to a Hazardous Waste Incinerator. PCB solid waste over 50ppm, will be bulked and sent offsite in rolloffs to a TSCA approved, Hazardous Waste Landfill. All non-hazardous waste solids, including the ACM material, will be bulked and sent offsite to a local Subtitle "D" Landfill. All water treatment filtration media will be removed from the vessels, sampled, and bulked for disposal with the haz or non-haz solids.

Sampling and Analysis: The floor areas in the Metal Working and Die Cast areas will be wipe sampled for Total PCB analysis. All hydraulic fluid generated from the flushing of overhead lines will be segregated from the transformer oil, and sampled for Total PCB, RCRA metals, and VOC's. Any solvents generated from the overhead lines will be tested for BTU and Flash Point, along with RCRA metals and VOC's. Oil drained from the transformers that has been resampled and verified to contain PCB in the percentages will be segregated along with the flushing agent, and resampled for Total PCB, BTU and Flash Point. The solids generated during the remedial activities (PPE, sludge, metal chips, and debris), will be sampled for PCB, RCRA metals and VOC's. Perimeter and Personnel air monitoring cassettes generated during ACM removal activities will be analyzed using the PLM method, Polarized Light Microscopy. Samples of ACM removed from the boiler tanks will be run under the same PLM method.

Reporting: EPA Form 1900-55's, CERCLA Offsite Disposal Report, Contractor's Final Site Report, Site Safety Plan, Daily Work Report, Site Progress Report, Special Reports (as specified).

2.2 Key Personnel and Responsibilities

EQ Response Coordinator: John Mullane Office No.: 800/500-0575

Lead Team Contractor: Environmental Restoration Office No.: (888) 814-7477

Response Manager: Jeff Rhinefield

Health and Safety Officer - EQ: Chris McKinney

Health and Safety Officer - Subcontractor: Lonnie Wright

QA/QC Officer - EQ: Jackie Doan

QA/QC Officer - Subcontractor: Kyle Dittmer

2.3 Resource Requirements

A. Personnel, Equipment, Materials, and Other Direct Costs (see Attachment No. 1)

PART 3. SCHEDULE

3.1 See Figure 1 for timeline chart

3.2 Milestones

Task	Start Date	Completion Date
Initial D.O. Notification:	12/04/02	12/04/02
Preplanning Visit:	03/25/03	03/25/03
Planning and Resource Coordination:	04/21/03	05/11/03
Mobilization:	05/12/03	05/13/03
Cleanup Activity:	05/13/03	07/02/03
Waste Sampling/Profiling:	05/26/03	06/08/03
Water Treatment:	05/19/03	06/27/03
Waste T&D:	06/23/03	06/30/03
Demobilization:	07/03/03	07/03/03

PART 4. BUDGET ALLOCATION

A. D.O. Ceiling:	$ 460,000.00
Estimated Labor:	$ 230,000.00
Estimated Equipment:	$ 50,000.00
Estimated Material:	$ 40,000.00
Estimated T&D and Analysis:	$ 140,000.00

PART 5. HEALTH AND SAFETY

Special Safety Considerations: Because of the possibility of combustible or explosive atmosphere being present in the Grit Blasting area baghouse, spark proof tools will be used to open the panels of the baghouse. The baghouse will need to be vented using non-explosive air moving equipment, then pressure washed and deconned from the outside. After the baghouse has been fully vented and rinsed from the outside, it will be monitored for LEL/02, and entered for the final decon. The PCB transformers throughout the plant will need to be isolated, locked out, and de-energized by a licensed electrician before draining and flushing of the PCB oils. All overhead work inside the plant requiring platforms or boom lifts, will be done after training is provided to the workers, and full body harnesses are issued for securing of personnel. All confined space or hot work will be done after the Response Manager and START conduct the appropriate monitoring, and the work permits are issued. Because of the size of Plant#2 and the lack of appropriate lighting, 2-way radios will be used to communicate between the crews.

PPE Requirements: All decon and draining activities are anticipated to be done in Level "C" PPE, with poly coated tyvek, inner and outer gloves, rubber overboots, hardhat with splash shield, respirator with GMC-E cartridges. The pumping and treating of onsite liquids through the mobile water treatment plant, and any rigging or moving of process equipment, will be conducted in modified Level "D" PPE. The hot cutting of any process equipment that has residual oil will be conducted in Level "C". Any tank entry, or pipe chase entry that fails the air monitoring requirements will be conducted in Level "B" PPE.

Site Safety Plan (SSP) Development:

- Draft SSP submitted by EQ on May 6, 2003;
- Final SSP submitted by EQ on May 9, 2003;

PART 6. SAMPLING, ANALYSIS, AND QA/QC

A. Site Characterization S & A:

Sampling & Analysis: Wipe samples and liquid samples for Total PCB's, VOC's RCRA Metals, TPH, BTU, Flashpoint, Ph, PLM for ACM samples, and solid samples for Total PCB's, RCRA Metals, Flashpoint, Ph and Total Cyanide

QA/QC Requirements: Level II

B. Confirmation S&A:

Sampling & Analysis: Wipe sampling for Total PCB, RCRA Metals, sampling of liquids for Total PCB's, RCRA Metals,VOC's, Ph. Asbestos samples will be analyzed by the PLM method.

QA/QC Requirements: Level II

C. Waste Management/Profiling S&A: Total PCB, RCRA Metals, VOC's, SVOC's, Flashpoint, BTU, Ph, TPH, and PLM for any asbestos related material.

PART 7. REGULATORY COMPLIANCE

Site Permits: NA

T&D Status: All PCB regulated material over 50 ppm will be regulated as a TSCA waste, and be shipped as "Hazardous Waste, Solid or Liquid, N.O.S. to either a Subtitle "C" Landfill or for incineration.

Other: A 10 day written notification and submittal of work plan to ILEPA and ILDPH are required before any asbestos removal activities can begin onsite.

PART 8. TASK CODE COST TRACKING

	Task	Description	Date Range
1)	01	Mobilization	05/12/03
2)	02	Floor decon	05/12/03-05/30/03
3)	03	Water Treatment	05/19/03-06/27/03
4)	04	Pipe Chase Decon/Videotaping	05/27/03-06/06/03
5)	05	3000 Gallon Tanker Decon	06/02/03
6)	06	Chip-Wringer Room	06/02/03
7)	07	Grit Area Baghouse	06/03/03-06/06/03
8)	08	Overhead Line Draining	06/09/03-06/13/03
9)	09	Boiler Room ACM Removal	06/16/03-06/18/03
10)	10	PCB Transformer Draining	06/18/03-06/27/03
11)	11	Waste Sampling and Analysis	05/26/03-06/08/03
12)	12	T&D of Waste	06/23/03-06/30/03
13)	13	Demobilization	07/03/03

FOSC Review/Approval _____ Date _____

ATTACHMENT 1
WORK PLAN RESOURCE LIST
EPA Contract No. 68-S5-9801
Task Order No. 117
Outboard Marine Corporation (OMC) Site

	PERSONNEL (CLIN)	**Rate/ST**	**Rate/OT**
	On-Site Labor		
1	Response Manager (S1-05)	$51.28	$51.28
1	Field Cost Administrator (S2-13)	$35.42	$47.21
1	WW Treatment Operator (S2-40)	$46.88	$62.36
1	Foreman (S1-10)	$36.39	$48.40
3	Cleanup Technicians (S2-03)	$34.57	$46.08
	Off-Site Labor	**Rate/ST**	**Rate/OT**
1	T&D Coordinator (S5-20)	$56.28	$56.28
1	Chemist (S4-01)	$38.26	$38.26
1	QA/QC Chemist (S4-07)	$49.54	$49.54

	EQUIPMENT (CLIN)	**Daily Rate**
1	8000 lb. Forklift (03-035-014)	$160.80
3	2-WD Pickup Trucks (01-036-010)	$47.28
1	Waste Water Treatment Unit	$0.00
1	3" Electric Subm. Pump (08-051-020)	$40.00

OTHER DIRECT COSTS (Materials, Rental Equipment, Services, Subs)	Price/Unit Price
1 - 34' Articulated Manlift rental	TBD
1 - 20,000 gal. Frac Tank rental	TBD
Ohlson Security (Offhours unarmed Security)	$15.50/hour
Rivers Bend Engineering (Onsite Environmental Compliance)	~ $1,040/month
Jim Rumford (EQ Onsite Consultant)	$33.00/hour

OTHER DIRECT COSTS (Travel)	Price/Unit Price
Lodging	$150.00/day
Per Diem	$50.00/day